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# Beltsville *Rhizobium* Culture Collection Catalog

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## ABSTRACT

Keyser, Harold H., and Richard F. Griffin.  
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The USDA Beltsville Rhizobium Culture  
Collection contains a wide array of root  
nodule bacteria that fix nitrogen in  
symbiosis with legumes. This catalog  
gives information on the collection  
holdings and the services provided by the  
staff. Strains in the collection are  
available to all interested persons as a  
service to the domestic and international  
agricultural and scientific community.

KEYWORDS: Bradyrhizobium, legumes,  
nitrogen fixation, nodulation, Rhizobium,  
serogroup.

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## CONTENTS

Services provided by the culture  
collection staff 1

Classification of Rhizobium and  
Bradyrhizobium 2

Using the catalog 3

Distinctive characteristics of selected  
soybean rhizobia 3

Table 1. Host legumes with USDA accession  
numbers for Rhizobium strains 6

Table 2. Rhizobium strains by USDA  
accession numbers with host legumes and  
bacterial classification 62

Appendix 74

Host legumes - previous and current  
nomenclature 74

Lyophilized cultures 76

Information form for new strain data  
records 77

Location of other Rhizobium culture  
collections 77

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# Beltsville *Rhizobium* Culture Collection Catalog

By Harold H. Keyser and Richard F. Griffin<sup>1</sup>

The USDA Beltsville *Rhizobium* Culture Collection is a public collection maintained by the staff of the Nitrogen Fixation and Soybean Genetics Laboratory at the Beltsville Agricultural Research Center. In this catalog are lists and descriptions of *Rhizobium* and *Bradyrhizobium* strains and isolates in the collection. This is the second edition of the catalog and is part of our continual effort to provide better information and services to users worldwide.

USDA soil microbiologists began collecting and evaluating *Rhizobium* strains in 1912. Since then the collection has been continually expanded to include not only agriculturally important strains but also isolates from a wide array of legumes. Since 1976 the U.S. Agency for International Development has supplemented USDA's support of the collection through a project known as the World *Rhizobium* Study and Collection Center. Its purpose is to assist developing countries in making increased use of *Rhizobium* for nitrogen fixation. This program's activities include acquiring and evaluating *Rhizobium* strains for tropical legumes, providing training in applied technology of the *Rhizobium*-legume symbiosis for scientists from the developing countries, and promoting the use of symbiotic nitrogen fixation in developing countries by supplying *Rhizobium* strains and related information and by collaborating in research studies.

## SERVICES PROVIDED BY THE CULTURE COLLECTION STAFF

Strains of *Rhizobium* in the Beltsville Culture Collection are available to all interested persons. Usually they are sent lyophilized in sealed glass ampules (see p. 76). If a requested strain is not in the Beltsville collection, the curator may be able to assist in obtaining it from another *Rhizobium* collection. Peat-based inoculant also can be provided users with special interests. However, inoculant should be requested well in advance of anticipated use.

The Beltsville *Rhizobium* Culture Collection also serves as a depository for *Rhizobium* germplasm. Individuals or institutions are encouraged to deposit isolates from host legumes not already represented in the collection, strains with unique characteristics, or valuable culture collections that persons or institutions can no longer maintain. Such germplasm will be incorporated into the collection and permanently preserved.

Deposition of isolates and strains can be arranged by writing to the culture collection staff and must be accompanied by an information form for new strain data records (see p. 77).

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# CLASSIFICATION OF RHIZOBIUM AND BRADYRHIZOBIUM

Rhizobia bacteria have recently been divided into the genera Rhizobium for fast-growing, acid-producing strains and Bradyrhizobium for slow-growing, alkaline-producing strains.<sup>2</sup> The new nomenclature is used in this catalog. The old and new bacteria classifications are as follows:

Host legumes	Previous nomenclature	Present nomenclature
Pea, vetch, lentil	<u>Rhizobium leguminosarum</u>	<u>Rhizobium leguminosarum</u> biovar. <u>viceae</u>
Clover	<u>Rhizobium trifolii</u>	<u>Rhizobium leguminosarum</u> biovar. <u>trifolii</u>
Common bean	<u>Rhizobium phaseoli</u>	<u>Rhizobium leguminosarum</u> biovar. <u>phaseoli</u>
Sweetclover, alfalfa	<u>Rhizobium meliloti</u>	<u>Rhizobium meliloti</u>
Soybean	<u>Rhizobium japonicum</u>	<u>Bradyrhizobium japonicum</u> , <u>Rhizobium fredii</u> <sup>1</sup>
Lotus sp. <sup>2</sup>	<u>Rhizobium</u> sp.	<u>Rhizobium loti</u>
Cowpea	<u>Rhizobium</u> sp.	<u>Bradyrhizobium</u> sp.

<sup>1</sup>Scholla, M.H., and G.H. Elkan. 1984. Rhizobium fredii sp. nov., a fast-growing species that effectively nodulates soybeans. Int. J. Syst. Bacteriol. 34:484-486.

<sup>2</sup>Slow-growing isolates from this host group are now classified as Bradyrhizobium sp.

<sup>2</sup>Jordan, D.C. 1982. Transfer of Rhizobium japonicum Buchanan 1980 to Bradyrhizobium gen. nov., a genus of slow-growing, root nodule bacteria from leguminous plants. Int. J. Syst. Bacteriol. 2:136-139.

Jordan, D.C. 1984. Family III. Rhizobiaceae Conn. 1938. In Krieg, N.R., and J.G. Holt, eds., Bergey's Manual of Systematic Bacteriology, p. 234-244. Williams and Wilkins, Baltimore, MD.



## USING THE CATALOG

In this second edition of the catalog, each Rhizobium strain is listed in two tables. In the first table the host legumes are given alphabetically, and strains are listed by their USDA accession numbers after the hosts from which they were isolated. In the second table each Rhizobium strain is listed by its USDA accession number followed by the host legume and current bacterial classification.

In the first table information is given in six columns. Column 1 includes the Latin name of the host legume followed by the author and the common name or names of the plant. The previous and current host legume nomenclature is listed on page 74. In column 2 is the current USDA accession number, which should be used to request strains. In column 3 are synonyms or the previous USDA designations and any known designations used in other collections. The names and addresses of other Rhizobium culture collections are given on page 77. In column 4 is the geographical location of the original host legume of isolation and in column 5 the date of this original isolation. The last column includes special comments. Strains that have been tested and found to nodulate but are ineffective at nitrogen fixation are so designated. Not all have been recently tested for their symbiotic effectiveness. Some well-characterized strains are listed as recommended if they have clearly demonstrated superior performance compared with other strains. For strains from Glycine max, the comments denote the serogroup.

Although the recommended strains have relative merit as determined under certain conditions, we believe that as many effective strains as possible should be tested by users to maximize chances of realizing an effective symbiosis under different environmental conditions and with specific host genotypes.

We welcome any information concerning strain performance from catalog users.

## DISTINCTIVE CHARACTERISTICS OF SELECTED SOYBEAN RHIZOBIA

Since the early 1960's much of the nitrogen fixation research at Beltsville has focused on the soybean-Bradyrhizobium symbiosis. Consequently, the rhizobia for soybean are the best characterized group in our collection. Because they are extensively used by researchers, we have summarized as follows the unique features of those strains most commonly requested.

### USDA 6

Antigen strain for serogroup 6 (also referred to as serogroup c1). Very effective at N<sub>2</sub>-fixation with most soybean cultivars. Forms few nodules or cortical proliferations and is ineffective at N<sub>2</sub>-fixation with cultivar Hardee (controlled by the host gene Rj<sub>2</sub>). Type strain for B. japonicum (ATCC 10324).<sup>3</sup>

### USDA 24

Forms nodules but is completely ineffective at N<sub>2</sub>-fixation on all soybean cultivars tested.

### USDA 31

Antigen strain for serogroup 31 (also referred to as serogroup c3). Poor to moderate effectiveness with most soybean cultivars.

Hup<sup>-</sup> (lacks hydrogenase expression) with soybean. Expresses ex planta (in pure culture) nitrogenase activity.

### USDA 33

Poor to moderate effectiveness with most soybean cultivars. Forms many nodulelike structures with white interior on cultivar Hardee (controlled by the host gene Rj<sub>3</sub>). Hup<sup>-</sup> with soybean.

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<sup>3</sup>For meaning of acronyms, see p. 77.

#### USDA 46

Antigen strain for serogroup 46 (also referred to as serogroup c2). Hup<sup>-</sup> with soybean. Expresses ex planta nitrogenase activity.

#### USDA 61

Produces rhizobitoxin with some cultivars. Under controlled conditions it nodulates and fixes N<sub>2</sub> with soybeans carrying the rj<sub>1</sub> (non-nodulating) gene. Forms only a few cortical proliferations with soybean cultivars Hill and Dunfield (controlled by the host gene Rj<sub>4</sub>). Hup<sup>-</sup> with soybean.

#### USDA 76

Antigen strain for serogroup 76. Produces rhizobitoxin with some soybean cultivars. Under controlled conditions it nodulates and fixes N<sub>2</sub> with soybeans carrying the rj<sub>1</sub> gene. Hup<sup>-</sup> with soybean. Expresses ex planta nitrogenase activity.

#### USDA 94

Antigen strain for serogroup 94. Produces rhizobitoxin with some soybean cultivars. Under controlled conditions it nodulates and fixes N<sub>2</sub> with soybeans carrying the rj<sub>1</sub> gene. Hup<sup>-</sup> with soybean. Expresses ex planta nitrogenase activity.

#### USDA 110

Antigen strain for serogroup 110. Very effective at N<sub>2</sub>-fixation with most soybean cultivars. Hup<sup>+</sup> with soybean.

#### USDA I-110

A selection from USDA 110. Unable to utilize mannitol.

#### USDA I-110 ARS

Triple spontaneous mutant selected from I-110. Resistant to azide, rifampicin, and streptomycin.

#### USDA 122

Antigen strain for serogroup 122. Very effective at N<sub>2</sub>-fixation with most soybean cultivars. Forms few nodules or cortical proliferations and is ineffective at N<sub>2</sub>-fixation with cultivar Hardee (controlled by the host gene Rj<sub>2</sub>). Hup<sup>+</sup> with soybean.

#### USDA 123

Antigen strain for serogroup 123. Moderately effective with most soybean cultivars. Forms large nodules but is ineffective with soybean cultivar Peking. Hup<sup>-</sup> with soybean.

#### USDA 136

Very effective at N<sub>2</sub>-fixation with most soybean cultivars. Forms few nodules or cortical proliferations and is ineffective at N<sub>2</sub>-fixation with cultivar Hardee (controlled by the host gene Rj<sub>2</sub>). Hup<sup>+</sup> with soybean. Same strain as CB 1809.

#### USDA 138

Very effective at N<sub>2</sub>-fixation with most soybean cultivars. Hup<sup>-</sup> with soybean.

#### USDA 142

Very effective at N<sub>2</sub>-fixation with most soybean cultivars. Hup<sup>+</sup> with soybean.

#### USDA 143

Very effective at N<sub>2</sub>-fixation with most soybean cultivars.

#### USDA 191

Fast-growing isolate from China. Very effective with cultivar Peking, poor to moderately effective with most other North American cultivars. Nif (nitrogen fixation) genes located on a large (ca. 200 megadaltons) plasmid. Hup<sup>-</sup> with soybean.

#### USDA 192

Fast-growing isolate from China. Antigen strain for serogroup 192. Very effective with cultivar Peking, ineffective and variable nodulation with most other North American cultivars. Hup<sup>-</sup> with soybean.

#### USDA 193

Fast-growing isolate from China. Antigen strain for serogroup 193. Very effective with cultivar Peking, ineffective and variable nodulation with most other North American cultivars. Nif genes located on a large (ca. 200 megadaltons) plasmid. Hup<sup>-</sup> with soybean.

#### USDA 194

Fast-growing isolate from China. Antigen strain for serogroup 194. Very effective with cultivar Peking, ineffective and variable nodulation with most other North American cultivars. Hup<sup>-</sup> with soybean.

#### USDA 205

Fast-growing isolate from China. Very effective with cultivar Peking, ineffective and variable nodulation with most other North American cultivars. Nif genes located on a large (ca. 115 megadaltons) plasmid. Hup<sup>-</sup> with soybean.

#### USDA 205-1A03

Non-nodulating mutant of USDA 205 obtained from growth on acridine orange. Largest (ca. 200 megadaltons) plasmid removed.

#### USDA 341

SM 5, mutagenized selection from 61A76. Inactive iron-molybdenum component of nitrogenase. Nodulates but does not fix N<sub>2</sub>.

Table 1

Host legumes with USDA accession numbers for Rhizobium strains

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Acacia constricta</u> Benth. ex A. Gray	3838 3839 3840 3841 3842 3843	-- -- -- -- -- --	-- -- -- -- -- --	1976 1976 1976 1976 1976 1976	
<u>Acacia decurrens</u> (Wendl.) Willd. green wattle	3001 3002 3327	1A0d1, Brazil 13-607 1A0d2, Brazil 13-637, SEMIA 3380 1A0dlb, Brazil 13-607	Brazil Brazil Brazil	1959 1959 1959	
<u>Acacia linifolia</u> (Vent.) Willd.	3003	1A0cl, ATCC 11446	Africa	1950	
<u>Acacia melanoxylon</u> R. Br.	3475	XF 2	Rep. South Africa	--	
<u>Acacia pennatula</u> (Schldl. & Cham.) Benth.	3328	--	--	--	
<u>Acacia stenoptera</u> Benth.	3476	XL 1	Australia	1960	
<u>Acacia</u> spp. acacias	3325 3326	-- --	Morocco Morocco	1974 1974	
<u>Adenanthera pavonina</u> L. red sandlewood	3478	MPI 3001, NUS 16	--	--	



<u>Adesmia</u> spp.	3329	- -	- -	- -
adesmias	3330	- -	- -	- -
<u>Aeschynomene</u> <u>americana</u> L.	3177	3G3cl	Arizona	1948
jointvetch	3331	3G3cla	Arizona	1948
	3332	3G3clb	Arizona	1948
	3516	Nitragin 3A4	Florida	1972
<u>Aeschynomene</u> <u>falcata</u> (Poiret) DC.	3333	CB 2312	- -	- -
<u>Albizia</u> <u>julibrissin</u> Durazz.	3004	1B0ala	Maryland	1952
silktree albizia, mimosa	3005	1B0a2a	- -	- -
	3334	1B0al	Maryland	1952
	3335	1B0a2	- -	- -
<u>Alysicarpus</u> <u>vaginalis</u> (L.) DC.	3304	3I7a2	Wisconsin	1938
alyceclover	3305	3I7a3, ACCC 14055	Florida	1938
	3306	3I7a4	- -	1936
	3556	3I7a1	Hawaii	1953
	3557	Nitragin 10A5	- -	1957
<u>Amorpha</u> <u>fruticosa</u> L.	3097	3F2dl	Virginia	1927
indigobush, false-indigo, bastard indigo				
<u>Anagyris</u> <u>foetida</u> L.	3558	Nitragin 11A3	- -	1936
<u>Anthyllis</u> <u>vulneraria</u> L.	3336	3E0el, Nitragin 6A1	Virginia	1961
kidneyvetch				
<u>Apios</u> <u>americana</u> Medikus	3240	3I2al	Maryland	1939
American potato bean				
<u>Arachis</u> <u>glabrata</u> Benth.	3347	Nitragin 8B6	Florida	1973
	3541	Nitragin 8B3	Florida	1971
	3542	Nitragin 8B5	- -	1973

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Arachis hypogaea</u> L. peanut, groundnut, goober	3179	3G4b4	Virginia	1930	Ineffective
	3180	3G4b5	Virginia	1930	
	3181	3G4b6	Virginia	1930	
	3183	3G4b9a	Virginia	1930	
	3184	3G4b10	Zimbabwe	1952	
	3185	3G4b16, Nitragin 8A45	- -	1960	Recommended
	3186	3G4b19	Maryland	1958	
	3187	3G4b20, R 411, ACCC 14066	Zimbabwe	1966	
	3188	3G4b21, R 468, ACCC 14067	Zimbabwe	1966	
	3337	3G4b12	- -	- -	
	3338	THA 201, NiftAL 967	Thailand	- -	
	3339	THA 205, NiftAL 968, Nitragin 8A52, ACCC 14069	Thailand	1979	
	3340	NiftAL 175	Texas	- -	
	3341	NiftAL 1000, SEMIA 6041, ACCC 14074	Hawaii	1978	
	3342	Nitragin 8A11, ACCC 14071	Texas	1974	Recommended
	3343	Nitragin 8A16, ACCC 14063	Texas	1975	
	3344	Nitragin 8A19, ACCC 14065	Texas	1975	
	3345	Nitragin 8A23, ACCC 14064	Florida	1977	
	3346	Nitragin 8A44, ACCC 14062	Florida	1977	
	3518	Nitragin 8A12	Texas	1974	
	3519	Nitragin 8A21	Florida	1977	
	3520	Nitragin 8A24	Florida	1977	
	3521	Nitragin 8A25	Florida	1977	
	3522	Nitragin 8A26	Florida	1977	
<u>Astragalus adsurgens</u> Pallas var. <u>robustior</u> Hook.	3357	3F6p1	North Dakota	1948	
<u>Astragalus aduncus</u> Willd.	3858	- -	- -	1974	
<u>Astragalus alpinus</u> L.	3348	3F6m1	North Dakota	1948	

<u>Astragalus americanus</u> (Hook.) M.E.	3854	--	Alaska	1962
Jones	3855	--	Alaska	1962
<u>Astragalus armatus</u> Willd.	3123	--	--	1956
<u>Astragalus canadensis</u> L. Canada milkvetch, Canadian rattleweed	3139	3F6k1	North Dakota	1949
<u>Astragalus cicer</u> L. cicer milkvetch	3349	3F6n4	--	1956
	3350	3F6n4a	--	1956
	3351	3F6n4b	--	1956
	3352	Nitragin 9B6	Alberta, Canada	1970
	3543	Nitragin 9B3	Alberta, Canada	1970
	3544	Nitragin 9B4	Alberta, Canada	1970
	3545	Nitragin 9B7	--	1974
	3546	Nitragin 9B8	--	1974
<u>Astragalus crassicaupus</u> Nutt. ground plum, buffalo plum	3146	3F6rl	North Dakota	1948
<u>Astragalus eucosmos</u> Robinson	3547	Nitragin 9CC2	Alaska	1962
	3548	Nitragin 9CC3	Alaska	1962
	3549	Nitragin 9CC6	Alaska	1964
<u>Astragalus falcatus</u> Lam.	3124	3F6dl a	Afghanistan	1956
	3353	3F6dl	Afghanistan	1956
	3354	3F6dlb	Afghanistan	1956
<u>Astragalus flexuosus</u> (Hook.) G. Don	3550	Nitragin 9DD1	South Dakota	1976
	3551	Nitragin 9DD2	South Dakota	1978
<u>Astragalus gummifer</u> Labill. gum tragacanth	3355	3F6el	--	--
	3356	3F6elb	--	--



Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Astragalus hypoglottis</u> L. purple milkvetch	3142 3143	3F6o1 3F6o2	North Dakota South Dakota	1948 1948	
<u>Astragalus mollissimus</u> Torrey woolly loco	3152a 3152c	3F6v1a 3F6v1c	Oklahoma Oklahoma	1953 1953	
<u>Astragalus onobrychis</u> L.	3147	3F6s1	Maryland	1956	
<u>Astragalus robbinsii</u> (Oakes) A. Gray var. <u>harringtonii</u> (Rydb.) Barneby	3853	- -	Alaska	1962	
<u>Astragalus siliquosus</u> Boiss.	3857	- -	- -	1974	
<u>Astragalus sinicus</u> L. Chinese milkvetch	3134 3135 3136 3137 3138 3466 3554 3555	3F6h5 3F6h8 3F6h9 3F6h10 3F6h11 Hu 7653 Nitragin 9G2 Nitragin 9G6	Japan Japan Japan Japan Japan China Taiwan Taiwan	1949 1949 1949 1949 1949 - - 1961 1961	Recommended
<u>Astragalus vexilliflexus</u> Sheldon	3149	3F6t1	Maryland	1956	
<u>Astragalus</u> spp. milkvetches	3150a 3153 3358	3F6u2a 3F6w1 3F6q2	China Maryland China	1949 1956 1949	

<u>Baptisia alba</u> (L.) R. Br.	3020	3B0f1	- -	- -	
<u>Baptisia australis</u> (L.) R. Br. var. <u>minor</u> (Lehm.) Fern. blue false-indigo, blue wild-indigo	3018	3B0e1	North Dakota	1948	
<u>Baptisia tinctoria</u> (L.) Vent. wild-indigo	3017	3B0b1	Pennsylvania	1933	
<u>Brownea ariza</u> Benth.	3479	MPI 3004, NUS 23	- -	- -	
<u>Cajanus cajan</u> (L.) Huth pigeon pea	3362	NIFTAL 569	Zimbabwe	1960	
	3363	Nitragin 21A8	Nigeria	1975	
	3364	3I5b1, ATCC 10805	Bahamas	1946	
	3472	P 132	- -	- -	Isolated from <u>Vigna unguiculata</u> subsp. <u>unguiculata</u>
	3473	P 148	- -	- -	
	3474	P 241	India	- -	Recommended
	3559	Nitragin 21A4	Hawaii	1962	
	3560	Nitragin 21A7	Matão, Brazil	1974	
	3561	Nitragin 21A8	Nigeria	1975	
	3562	Nitragin 21A12	Nigeria	1975	
	3563	Nitragin 21A16	Nigeria	1975	
<u>Calopogonium</u> spp.	3365	Nitragin 26Z4	Ibadan, Nigeria	1975	
<u>Canavalia ensiformis</u> (L.) DC. jackbean, horsebean, swordbean	3317	Nitragin 22A5	Matão, Brazil	1974	Also effective on <u>Phaseolus lunatus</u>
	3318	Nitragin 22A4	Matão, Brazil	1974	Also effective on <u>Phaseolus lunatus</u>
<u>Caragana arborescens</u> Lam.	3127	3F6g2	Colorado	1936	
Siberian pea tree, caragana pea tree	3128	3F6g3	- -	1936	
	3129	3F6g4	- -	1936	
	3366	3F6g1, Nitragin 23A1	- -	1938	

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Centrosema plumieri</u> (Turpin ex Pers.) Benth.	3480	MPI 3008, NUS 13	- -	- -	
<u>Centrosema pubescens</u> Benth.	3239	3Ile1	Thailand	1959	
	3367	CB 1923, RCR 3830, C 101a, IITA 1008	Brazil	- -	
	3368	Nitragin 25B8	Brazilia, Brazil	1974	
	3452	RCR 3826, CB 1103	- -	- -	
<u>Centrosema virginianum</u> (L.) Benth. spurred butterfly-pea	3176	3G3b1, Nitragin 25A1	Maryland	1940	
<u>Centrosema</u> spp.	3369	Nitragin 25Z1	- -	- -	
<u>Chamaecrista fasciculata</u> (Michaux) E. Greene	3010	2B0a1	Maryland	1940	
	3011	2B0a2, Nitragin 24A2	- -	1935	
partridgepea	3013	2B0a4, Nitragin 24A4	Oklahoma	1948	
	3014	2B0a5	- -	1935	
	3570	Nitragin 24A6	Louisiana	1953	
	3571	Nitragin 24A7	Mississippi	1953	
	3572	Nitragin 24A8	Louisiana	1953	
	3573	Nitragin 24A9	Louisiana	1953	
	3574	Nitragin 24A13	Iowa	1969	
	3575	Nitragin 24A15	Louisiana	1953	
<u>Chamaecrista mimosoides</u> (L.) E. Greene	3016	2B0d1	North Carolina	1933	

<u>Chamaecrista nictitans</u> (L.) Moench wild sensitive plant	3015	2B0c1	Maryland	1939	
<u>Cicer arietinum</u> L. chickpea, garbanzo	3228	3H0a1, ATCC 11444, CB 1189, SEMIA 3000, NifTAL 385	India	1936	
	3229	3H0a2	- -	- -	
	3231	3H0a4, SEMIA 3001	Arkansas	1939	
	3232	3H0a5	- -	1944	
	3233	3H0a6, Nitragin 27A12	New York	1939	
	3234	3H0a8, Nitragin 27A13	Arkansas	1939	
	3235	3H0a9	Arkansas	1939	
	3236	3H0a10	Arkansas	1939	
	3237	3H0a12	- -	- -	
	3370	Ca 7, Nitragin 27A16	Cáceres, Spain	1976	
	3371	Ca 36, Nitragin 27A17	Leon, Spain	1978	
	3372	USAB 67, NifTAL 480, SEMIA 0397	India	- -	
	3373	Ca 142, Nitragin 27A18	Córdoba, Spain	1978	
	3377	Nitragin 27A2, RCR 3828, USDA 691, ICRISAT 3828	- -	- -	
	3378	Nitragin 27A3, USDA 3100, SEMIA 0396	- -	- -	Recommended
	3379	Nitragin 27A8	Mexico	1963	Recommended
	3380	Nitragin 27A9	Mexico	1963	
	3381	Nitragin 27A10	Mexico	1971	
	3481	MPI 3010, IHP 50	- -	- -	
	3482	MPI 3011, IHP 96	- -	- -	
	3483	MPI 3012, IHP 99	- -	- -	
<u>Coronilla cretica</u> L.	3170	3G1c1	Maryland	1948	
	3170a	3G1c1a	Maryland	1948	
	3590	3G1c6, Nitragin 31A6	- -	1949	
<u>Coronilla emerus</u> L. scorpion-senna	3382	- -	Morocco	1974	

Table 1

Host legumes with USDA accession numbers for Rhizobium strains—Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Coronilla varia</u> L. crownvetch	3160	3G1b2	Virginia	1935	
	3161	3G1b3	Virginia	1932	Ineffective
	3163	3G1b5	Virginia	1934	
	3164	3G1b6	Virginia	1934	Ineffective
	3165	3G1b7	Virginia	1935	Recommended
	3167	3G1b9	- -	1961	Recommended
	3168	3G1b10	Illinois	1964	
	3169	3G1b12	Wisconsin	1964	
<u>Crotalaria alata</u> Buch.-Ham. ex D. Don	3031	3C1b1	Maryland	1932	
<u>Crotalaria incana</u> L.	3032	3C1i1	Maryland	1932	
	3033	3C1i2	Maryland	1940	
<u>Crotalaria juncea</u> L. sunn-hemp	3024	3C1b1	Washington, DC	1925	
	3025	3C1b2	India	1948	
	3025a	3C1b2a, ACCC 19002	India	1948	
	3025b	3C1b2b	India	1948	
	3027	3C1b4, Brazil 13-634	Brazil	1959	
	3028	3C1b5, Brazil 13-603	Brazil	1959	
<u>Crotalaria lanceolata</u> E. Meyer lanceleaf crotalaria	3035	3C1j1	Maryland	1932	
<u>Crotalaria pallida</u> Aiton smooth crotalaria	3036	3C1k1	Maryland	1932	
	3037	3C1k2	- -	- -	
	3038	3C1k3	Florida	1943	

<u>Crotalaria paulina</u> Schrank	3384	Nitragin 32H1, ACCC 14075	Pôrto Alegre, Brazil	1967	Broad spectrum strain, recommended for <u>Vigna</u> <u>unguiculata</u> subsp. <u>unguiculata</u> and <u>Cajanus cajan</u>
<u>Crotalaria retusa</u> L. Cherokee-clover	3029	3Cl1d1	Maryland	1932	
<u>Crotalaria sagittalis</u> L. rattlebox	3021	3Cl1a1, ATCC 100316, ACCC 19001	- -	- -	
	3022	3Cl1a2	Maryland	1932	
	3023	3Cl1a3	South Carolina	1939	
<u>Crotalaria senegalensis</u> (Pers.) Bacle ex DC.	3039	3Cl1I1	Maryland	1932	
<u>Crotalaria spectabilis</u> Roth showy crotalaria	3030	3Cl1f1	Maryland	1932	
<u>Cyamopsis tetragonoloba</u> (L.) Taubert	3089	3Fl1a1, Nitragin 33A1	- -	- -	
clusterbean, guar	3385	3Fl1a2, Nitragin 33A2	- -	- -	
	3386	3Fl1a3, Nitragin 33A3	- -	- -	
<u>Dalea alopecuroides</u> Willd.	3095	3F2b2, ATCC 10034	Iowa	1924	
	3387	3F2b4	- -	- -	
<u>Dalea candida</u> Michaux ex Willd.	3098	3F2f1	North Dakota	1949	
<u>Dalea phleoides</u> (Terry & A. Gray) Shinn. var. <u>microphylla</u> (Torrey & A. Gray) Barneby	3744	Nitragin 124B3	- -	1972	



Table 1

Host legumes with USDA accession numbers for Rhizobium strains—Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Dalea purpurea</u> Vent.	3741	Nitragin 124A2	- -	1972	
	3742	Nitragin 124A3	- -	1972	
	3743	Nitragin 124B2	- -	1972	
<u>Desmanthus illinoensis</u> (Michaux) Macmillan ex Robinson & Fern. prairie-mimosa, prickleweed	3006	1C0a1	Oklahoma	1954	
<u>Desmanthus virgatus</u> (L.) Willd. var. <u>depressus</u> (Humb. & Bonpl. ex Willd.) B. Turner	3607	Nitragin 43C1	- -	1964	
<u>Desmodium adscendens</u> (Sw.) DC.	3875	- -	- -	1981	
<u>Desmodium barbatum</u> (L.) Benth.	3388	Nitragin 41H1	Matão, Brazil	1974	
	3873	- -	Matão, Brazil	1974	
<u>Desmodium canum</u> (J.F. Gmel.) Schinz & Thell. kaimi-clover	3224	3G5s1	Florida	1948	
	3484	MPI 3013, NUS 36	- -	- -	
<u>Desmodium cuspidatum</u> (Muhlenb. ex Willd.) Loudon	3193	3G5b1	Maryland	1940	
<u>Desmodium heterocarpon</u> (L.) DC.	3598	Nitragin 41G3	Florida	1972	
<u>Desmodium heterophyllum</u> (Willd.) DC.	3389	CB 2085	- -	- -	
	3485	MPI 3014, NUS 18	- -	- -	



<u>Desmodium illinoense</u> A. Gray	3195	3G5e1	- -	- -
<u>Desmodium intortum</u> (Miller) Urban	3390	CB 627, SU 370, NIFTAL	Zaire	1962
beggarlice	3486	691 MPI 3015, NUS 37	- -	- -
<u>Desmodium nicaraguense</u> Oersted	3226	3G5u1	Puerto Rico	1951
	3226a	3G5ula	Puerto Rico	1951
<u>Desmodium sessilifolium</u> Torrey & A. Gray	3596	3G5n3, Nitragin 41E3	Florida	1947
<u>Desmodium tortuosum</u> (Sw.) DC.	3189	3G5a1	Virginia	1914
Florida beggarweed	3190	3G5a2	Maryland	1913
	3191	3G5a4	South Carolina	1939
	3391	3G5a6	- -	- -
<u>Desmodium triflorum</u> (L.) DC.	3487	MPI 3017, NUS 20	- -	- -
three-flower beggarweed				
<u>Desmodium uncinatum</u> (Jacq.) DC.	3597	Nitragin 41F4	Georgia	1969
<u>Desmodium</u> spp.	3225	3G5t1a	Ecuador	1948
beggarweeds	3601	Nitragin 41Z4	Costa Rica	1955
	3602	Nitragin 41Z6	Costa Rica	1955
	3603	Nitragin 41Z7	Costa Rica	1955
	3604	Nitragin 41Z8	Costa Rica	1955
<u>Eriosema englerianum</u> Harms	3612	Nitragin 48A2	- -	1957
<u>Erythrina fusca</u> Lour.	3488	MPI 3019, NUS 42	- -	- -
<u>Erythrina speciosa</u> Andrews	3242	3I2c1, ATCC 11448	Maryland	1939

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain		Geographical sources	Year	Comments
	accession numbers	Synonyms			
<u>Erythrina variegata</u> L.	3241	3I2b1, ATCC 10317	- -	- -	
<u>Eysenhardtia texana</u> Scheele Texas kidneywood	3613	Nitragin 49A1	- -	1971	
<u>Faidherbia albida</u> (Del.) A. Chev. apple-ring acacia	3320	- -	Maryland	- -	
	3321	- -	Maryland	- -	
	3322	- -	Maryland	- -	
	3323	- -	Maryland	- -	
	3324	- -	Maryland	- -	
<u>Galactia striata</u> (Jacq.) Urban	3393	Nitragin 58B1, NifTAL 193, IRI 1394	Matão, Brazil	1974	
<u>Galega officinalis</u> L. goatsrue	3102	3F3a1	- -	1949	
	3394	Nitragin 59A2	Prague, Czechoslovakia	1961	
<u>Gliricidia sepium</u> (Jacq.) Kunth ex Walp.	3489	MPI 3020, WBM 17	- -	- -	
	3490	MPI 3021, WBM 18	- -	- -	
<u>Glycine max</u> (L.) Merr. soybean	1	3I1b1	Virginia	1913	Serogroup 6
	2	3I1b2	Iowa	1926	Serogroup 123
	3	3I1b3	Virginia	1913	Serogroup 6
	4	3I1b4	Iowa	1932	Serogroup 4
	5	3I1b5	Indiana	1935	Serogroup 123
	6	3I1b6, ATCC 10324, SEMIA 5052, RCR 3425, IITA 2116, ACCC 15032	Japan	1929	Serogroup 6

7	3I1b7	Virginia	1915	Serogroup 6
8	3I1b8	Virginia	1915	Serogroup 76
9	3I1b9	Virginia	1916	Serogroup 6
10	3I1b10	Iowa	1927	Serogroup 123
11	3I1b11	- -	1920	Serogroup 6
13	3I1b13	Maryland	1937	Serogroup 31
14	3I1b14	Virginia	1921	Serogroup 6
15	3I1b15	- -	1934	Serogroup 6
16	3I1b16	North Carolina	1935	Serogroup 110
17	3I1b17	Yugoslavia	1955	Serogroup 110
19	3I1b19	Wisconsin	1922	Serogroup 6
20	3I1b20	- -	1925	Serogroup 110
21	3I1b21	- -	1925	Serogroup 6
22	3I1b22	- -	1925	Serogroup 61
23	3I1b23, Nitragin 61A23	- -	1925	
24	3I1b24, Nitragin 61A24, ATCC 11927, NifTAL 1248, NifTAL 99, RCR 3403, ACCC 15045	- -	1925	Serogroup 6
26	3I1b26	North Carolina	1940	Serogroup 31
27	3I1b27	Florida	1940	Serogroup 123
28	3I1b28	- -	1928	Serogroup 123
29	3I1b29, Nitragin 61A63	- -	1936	Serogroup 31
30	3I1b30	Iowa	1940	Serogroup 110
31	3I1b31, Nitragin 61A164, NifTAL 778	Wisconsin	1941	Serogroup 31
32	3I1b32	- -	1926	
33	3I1b33, NifTAL 843	- -	1926	Serogroup 31
34	3I1b34	Virginia	1927	Serogroup 6
35	3I1b35	Washington, DC	1927	Serogroup 6
36	3I1b36	Virginia	1927	Serogroup 126
37	3I1b37	Washington, DC	1927	Serogroup 6
38	3I1b38, RCR 3426	Japan	1929	Serogroup 38-115
39	3I1b39	Japan	1929	Serogroup 31
40	3I1b40	New Jersey	1941	Serogroup 31
41	3I1b41	Japan	1929	Serogroup 6
43	3I1b43	Japan	1929	Serogroup 6
44	3I1b44	- -	1930	Serogroup 6
45	3I1b45	Japan	1929	Serogroup 38-115
46	3I1b46, Nitragin 61A66, SEMIA 0584	Alabama	1943	Serogroup 46
47	3I1b47	Japan	1931	Serogroup 38-115

Table 1  
Host legumes with USDA accession numbers for Rhizobium strains—Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Glycine max</u> (con.)	48	3I1b48, Nitragin 61A67	Virginia	1929	Serogroup 6
	50	3I1b50	Japan	1931	Serogroup 6
	51	3I1b51	Virginia	1932	Serogroup 4
	52	3I1b52	Maryland	1932	Serogroup 6
	53	3I1b53	Maryland	1936	Serogroup 4
	54	3I1b54	Maryland	1936	Serogroup 4
	55	3I1b55	Maryland	1934	Serogroup 4
	56	3I1b56, NC 4	North Carolina	1946	Serogroup 38-115
	57	3I1b57	North Carolina	1946	Serogroup 6
	59	3I1b59, SEMIA 5057, NC 13, Nitragin 61A68	North Carolina	1946	
	61	3I1b61	North Carolina	1946	Serogroup 31
	62	3I1b62	North Carolina	1946	Serogroup 62
	63	3I1b63	North Carolina	1946	
	64	3I1b64	North Carolina	1946	Serogroup 110-115
	65	3I1b65	North Carolina	1946	
	66	3I1b66	North Carolina	1948	Serogroup 76
	66a	3I1b66a, Nitragin 61A69	North Carolina	1948	Serogroup 6
	67	3I1b67	North Carolina	1948	Serogroup 31
	70	3I1b70	North Carolina	1948	Serogroup 6
	71	3I1b71, NifTAL 100	Arizona	1948	Serogroup 46
	71a	3I1b71a, ACCC 15033	Arizona	1948	Serogroup 46
	72	3I1b72	Mississippi	1952	Serogroup 6
	73	3I1b73, SEMIA 5051	Virginia	1953	Serogroup 6
	74	3I1b74	California	1956	Serogroup 76
	75	3I1b75	Yugoslavia	1955	Serogroup 4
	76	3I1b76	plant passage of 74	1956	Serogroup 76
	77	3I1b77	plant passage of 74	1956	Serogroup 76
	78	3I1b78	plant passage of 74	1956	Serogroup 76
	83	3I1b83	Maryland	1956	Serogroup 31

84	3I1b84	Maryland	1956	Serogroup 76
84a	3I1b84a	Maryland	1956	
85	3I1b85	Maryland	1956	Serogroup 76
86	3I1b86	Maryland	1956	
90	3I1b90	Mississippi	1956	
91	3I1b91	Mississippi	1956	
92	3I1b92	Mississippi	1956	
93	3I1b93	North Carolina	1956	Serogroup 94
94	3I1b94, RCR 3422	North Carolina	1956	Serogroup 94
96	3I1b96	North Carolina	1956	Serogroup 94
97	3I1b97	North Carolina	1956	Serogroup 94
98	3I1b98	North Carolina	1956	Serogroup 94
98a	3I1b98a	North Carolina	1956	Serogroup 94
99	3I1b99	North Carolina	1956	Serogroup 94
99b	3I1b99b	North Carolina	1956	Serogroup 94
100	3I1b100, Nitragin 61A19	- -	1957	Serogroup 46
101	3I1b101, Nitragin 61A71	Louisiana	1948	
103	3I1b103, Nitragin 61A62	Mississippi	1953	Serogroup 76
105	3I1b105	- -	1958	Serogroup 123
106	3I1b106	- -	1958	Serogroup 4
110	3I1b110, NiftAL 102, IITA 2121, IITA 2018, RCR 3427, SEMIA 5032, ACCC 15034, Nitragin 61A89	Florida	1959	Serogroup 110
I-110	- -	USDA 110	- -	
I-110	- -	USDA 110	- -	
ARS				
I-110	- -	USDA 110	- -	
FN				
111	3I1b111	Mississippi	1959	Serogroup 46
112	3I1b112	Georgia	1959	Serogroup 6
113	3I1b113, Brazil 13-524	Brazil	1959	Serogroup 6
114	3I1b114, Brazil 13-526	Brazil	1959	Serogroup 38-115
115	3I1b115, Brazil 13-527, Nitragin 61A151	Brazil	1959	Serogroup 38-115
116	3I1b116, Brazil 13-530	Brazil	1959	Serogroup 31
117	3I1b117, NiftAL 694	Mississippi	1959	Serogroup 76
119	3I1b119	South Carolina	1969	Serogroup 94
120	3I1b120	Illinois	1956	Serogroup 31
121	3I1b121	Ohio	1965	
122	3I1b122, IITA 2126, ACCC 15035	Mississippi	1960	Serogroup 122



Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Glycine max</u> (con.)	123	3I1b123, NifTAL 376, ACCC 15036	Iowa	1960	Serogroup 123
	124	3I1b124	Mississippi	1960	Serogroup 124
	125	3I1b125	Maryland	1961	Serogroup 125-126
	126	3I1b126, RCR 3428	Maryland	1961	Serogroup 125-126
	127	3I1b127	Iowa	1961	Serogroup 76-123
	127a	3I1b127a	Iowa	1961	Serogroup 76-123
	127b	3I1b127b	Iowa	1961	Serogroup 76-123
	129	3I1b129	Iowa	1961	Serogroup 122-123
	130	3I1b130	Maryland	1961	Serogroup 130
	131	3I1b131, Nitragin 61A22	- -	1961	Serogroup 6
	132	3I1b132, Nitragin 61A51	Louisiana	1948	Serogroup 122
	133	3I1b133, Nitragin 61A54	Louisiana	1948	Serogroup 122
	134	3I1b134	Illinois	1961	Serogroup 38-115
	135	3I1b135, ACCC 15044, Nitragin 61A117	Iowa	1961	Serogroup 135
	136	3I1b136, CB 1809, SEMIA 0586, NifTAL 379, IITA 2114, RCR 3407, ACCC 15043, Nitragin 61A136	Maryland	1961	Serogroup 122
	137	3I1b137	Iowa	1961	Serogroup 110
	138	3I1b138, NifTAL 377, IITA 2123, SEMIA 5028, Nitragin 61A118, ACCC 15037	Mississippi	1961	Serogroup 6
	139	3I1b139	Iowa	1961	Serogroup 123
	140	3I1b140, RCR 3429, Nitragin 61A133	Bolivia	1959	Serogroup 62
	141	3I1b141, THA 18-8	Thailand	1963	Serogroup 110
	142	3I1b142, IITA 2125, B 1, SEMIA 5058, ACCC 15038, Nitragin 61A148	India	1973	Serogroup 122

143	3I1b143, IITA 2127, B 19, SEMIA 5059, ACCC 15039, Nitragin 61A149	India	1973	Serogroup 122
144	3I1b144, B 20	India	1973	
145	J 507	Japan	- -	
146	- -	Harbin, China	1979	
147	- -	Harbin, China	1979	
148	- -	Harbin, China	1979	
149	- -	Harbin, China	1979	
150	- -	Harbin, China	1979	
151	- -	Harbin, China	1979	
152	- -	Harbin, China	1979	
153	- -	Harbin, China	1979	
154	- -	Harbin, China	1979	
155	- -	Harbin, China	1979	
156	- -	Harbin, China	1979	
157	- -	Harbin, China	1979	
158	- -	Harbin, China	1979	
159	- -	Harbin, China	1979	
160	- -	Harbin, China	1979	
161	- -	Harbin, China	1979	
162	- -	Harbin, China	1979	
163	- -	Suihua, China	1979	
164	- -	Suihua, China	1979	
165	- -	Suihua, China	1979	
166	- -	Suihua, China	1979	
167	- -	Suihua, China	1979	
168	- -	Suihua, China	1979	
169	- -	Suihua, China	1979	
170	- -	Suihua, China	1979	
171	- -	Suihua, China	1979	
172	- -	Suihua, China	1979	
173	- -	Shenyang, China	1979	
174	- -	Shenyang, China	1979	
175	- -	Harbin, China	1979	
176	- -	Harbin, China	1979	
177	- -	Harbin, China	1979	
178	- -	Suihua, China	1979	
179	- -	Harbin, China	1979	
180	- -	Harbin, China	1979	
181	- -	Harbin, China	1979	
182	- -	Harbin, China	1979	



Table 1  
Host legumes with USDA accession numbers for Rhizobium strains—Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Glycine max</u> (con.)	183	--	Shenyang, China	1979	
	184	--	Shenyang, China	1979	
	185	--	Shenyang, China	1979	
	186	--	Shenyang, China	1979	
	187	--	Shenyang, China	1979	
	188	--	Shenyang, China	1979	
	189	--	Tieling, China	1979	
	190	--	Tieling, China	1979	
	191	440, PRC 191	Shanghai, China	1979	
	192	Ob 2, PRC 192	Tsinan, China	1980	Serogroup 192
	193	Ob 3, PRC 193	Taiyüan, China	1980	Serogroup 193
	194	PRC 194	Chengchou, China	1979	Serogroup 194
	201	PRC 201	Chengchou, China	1979	Serogroup 194
	205	PRC 205	Chengchou, China	1979	Serogroup 193
	206	PRC 206	Hsinhsiang, China	1979	Serogroup 193
	208	PRC 208	Hsinhsiang, China	1979	Serogroup 193
	214	PRC 214	Hsinhsiang, China	1979	Serogroup 193
	217	PRC 217	Hsinhsiang, China	1979	Serogroup 192
	218	--	Tieling, China	1979	
	219	--	Tieling, China	1979	
	220	--	Tieling, China	1979	
	221	--	Tsinan, China	1979	
	222	--	Tsinan, China	1979	
	223	--	Tsinan, China	1979	
	224	--	Tsinan, China	1979	
	225	--	Yentai, China	1979	

226	--	Yentai, China	1979	
227	--	Yentai, China	1979	
228	--	Yentai, China	1979	
229	--	Sian, China	1979	
230	--	Sian, China	1979	
231	--	Tieling, China	1979	
232	--	Harbin, China	1979	
233	--	Harbin, China	1979	
234	--	Suihua, China	1979	
235	--	Suihua, China	1979	
236	--	Tieling, China	1979	
237	--	Tsinan, China	1979	
238	--	Hokkaido, Japan	1978	
239	--	Hokkaido, Japan	1978	
240	--	Hokkaido, Japan	1978	
241	--	Shanghai, China	1978	
242	--	Yentai, China	1978	
243	--	Yentai, China	1978	
244	--	Yentai, China	1978	
245	--	Yentai, China	1978	
246	--	Yentai, China	1978	
247	--	Kiran, China	1978	
248	--	Kiran, China	1978	
249	--	Harbin, China	1978	
250	--	Harbin, China	1978	
251	--	Harbin, China	1978	
252	--	Yentai, China	1978	
253	--	Keshan, China	1978	
254	--	Keshan, China	1978	
255	--	Keshan, China	1978	
256	--	Keshan, China	1978	
257	--	Wukung, China	1979	Serogroup 192
258	--	Shanghai, China	1978	
259	--	Shanghai, China	1978	
260	--	Shanghai, China	1978	
269	WB 1	South Africa	--	
270	WB 19	South Africa	--	
271	WB 61	South Africa	--	
272	WB 68, NifTAL 937, B 38	South Africa	--	
273	WB 69	South Africa	--	
274	B 11	India	1973	
275	B 13	India	1973	Serogroup 46
276	R 11a	Brazil	1972	Serogroup 6

Table 1  
Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Glycine max</u> (con.)	277	R 54a, Nitragin 61A134	Brazil	1972	Serogroup 38
	278	Bus 1	India	--	
	279	Bus 16	India	--	
	280	315 B	Rwanda	1972	
	284	315 B 3	Rwanda	1972	
	285	315	Rwanda	1972	
	286	554	Yugoslavia	--	
	287	Sg	Yugoslavia	--	
	288	Sp	Yugoslavia	--	
	289	Zsn	Yugoslavia	--	
	290	Stig	Yugoslavia	--	
	291	Ss	Yugoslavia	--	
	292	Sk	Yugoslavia	--	
	293	272	Zimbabwe	--	
	294	360	Zimbabwe	--	
	295	362	Zimbabwe	--	
	296	402	Zimbabwe	--	
	297	404	Zimbabwe	--	
	298	824	Zimbabwe	--	
	299	839	Zimbabwe	--	
	300	965	Zimbabwe	--	
	301	2F5	Japan	--	
	302	238A	Japan	--	
	309	29w	Brazil	--	
	310	587	Brazil	--	
	312	13-533	Brazil	--	
	313	THA 7, NifTAL 413	Thailand	--	
	317	GM 1	Africa	1961	
	318	GM 16	Africa	--	
	319	Hi N	Maryland	--	Serogroup 76
	321	13-206	Brazil	--	
	322	B 15	China	1979	
	323	Nitragin 61A59	Iowa	1950	
	324	Nitragin 61A76, NifTAL 104	Mississippi	1953	

325	THA 1, NifTAL 409	Thailand	--	
326	THA 2, NifTAL 410	Thailand	--	
327	THA 3, NifTAL 411	Thailand	--	
328	THA 4	Thailand	--	
329	THA 5	Thailand	--	
330	THA 6, NifTAL 412	Thailand	--	
331	B 13*	India	1973	Serogroup 46
332	PRC 005, NifTAL 149	China	--	
333	Hu 5, NifTAL 154	China	--	
334	Hu 24, NifTAL 150	China	--	
335	PRC 113-2, NifTAL 155	China	--	Serogroup 110
336	Hu 121-6	China	--	
337	Hu 2031	China	--	
338	Ishizawa 501	Japan	--	
339	Ishizawa J-506	Japan	--	
340	Ishizawa 619	Japan	--	
341	Nitragin 61A164, SM 5, Mutant of 61A76	--	--	Ineffective
342	Nitragin 61A165, HS 11, Mutant of I-110	Wisconsin	1978	Ineffective

Glycyrrhiza lepidota Pursh  
wild licorice

3620	Nitragin 62B1	South Dakota	1978
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Hedysarum alpinum L.

3877	--	Alaska	1962
3878	--	Alaska	1962

Hedysarum alpinum var. americanum  
Michaux

3880	--	Alaska	1962
3881	--	Alaska	1962
3882	--	Alaska	1962

Hedysarum boreale Nutt.  
sweetvetch

3174	3G2e1	North Dakota	1948
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Hedysarum boreale Nutt. subsp.  
mackenziei (Richardson) Welsh

3876	--	Alaska	1966
3883	--	Alaska	1962
3884	--	Alaska	1962

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Hedysarum coronarium</u> L. French honeysuckle	3171	3G2a1	- -	1921	
<u>Hippocrepis multisiliquosa</u> L.	3895	- -	Tunisia	1981	
	3896	- -	Tunisia	1981	
	3897	- -	Tunisia	1981	
<u>Indigofera fulvopilosa</u> Brenan	3633	Nitragin 79F2	- -	1964	
<u>Indigofera gracilis</u> Sprengel	3916	- -	California	1975	
	3917	- -	California	1975	
	3918	- -	California	1975	
	3919	- -	California	1975	
<u>Indigofera hirsuta</u> L. hairy indigo	3090	3F1e1	Florida	1942	
	3091	3F1e2	Florida	1948	
	3091a	3F1e2a	Florida	1948	
	3091b	3F1e2b	Florida	1948	
	3092	3F1e3	Florida	1950	
	3093	3F1e4, Nitragin 79Z3	Florida	1954	
	3093a	3F1e4a	Florida	1954	
	3396	3F1e3a	Florida	1950	
<u>Indigofera suffruticosa</u> Miller	3632	Nitragin 79C3	- -	1972	
<u>Lablab purpureus</u> (L.) Sweet hyacinth-bean	3397	3I6o2, ATCC 10806	Arizona	1950	Ineffective
	3398	Nitragin 42B3, NifTAL 197	Brazil	1974	
	3605	Nitragin 42B1	Matão, Brazil	1974	

<u>Lathyrus cicera</u> L.	2422	- -	Morocco	1974
<u>Lathyrus hirsutus</u> L.	2417	3Hlu2	Alabama	1940
rough pea, caley pea	2418	3Hlu4	Alabama	1940
	2419	3Hlu7	South Carolina	1949
	2428	NifTAL 634, SEMIA 0388, Nitragin 92A3, NZP 5400	Mississippi	1954
<u>Lathyrus japonicus</u> Willd.	2444	Nitragin 92AA3	- -	1963
<u>Lathyrus latifolius</u> L.	2445	Nitragin 92B3	South Carolina	1972
everlasting pea, perennial pea	2446	Nitragin 92B5	South Carolina	1972
<u>Lathyrus ochroleucus</u> Hook.	2416	3Hlgla	North Dakota	1948
<u>Lathyrus polymorphus</u> Nutt.	2414	3Hlcl	New Mexico	1949
<u>Lathyrus sphaericus</u> Retz.	2410	3Hla1	Alabama	1941
<u>Lathyrus tuberosus</u> L.	2411	3H1b1a	North Dakota	1948
	2412	3H1b2a	Maryland	1948
	2413	3H1b3a	Kansas	1949
	2423	3H1b1	North Dakota	1948
	2424	3H1b2	Maryland	1948
	2425	3H1b3	Kansas	1949
<u>Lens culinaris</u> Medikus	2426	Brazil 344	- -	- -
lentil	2429	NifTAL 640, SEMIA 0390	Hawaii	1978
	2430	M2 18	- -	- -
	2431	W2 201	- -	- -
	2432	C4 201	- -	- -
	2433	K4 202	- -	- -
<u>Lespedeza bicolor</u> Turcz.	3221	3G5p1	South Carolina	1940
bicolor lespedeza	3222	3G5p2	South Carolina	1940



Table 1  
Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Lespedeza capitata</u> Michaux	3201	3G5h1	Ohio	1940	
	3202	3G5h2, Nitragin 93A2	Ohio	1940	
	3203	3G5h3	Ohio	1940	
<u>Lespedeza cyrtobotrya</u> Miq.	3223	3G5q2	- -	- -	
<u>Lespedeza daurica</u> (Laxm.) Schindler	3650	Nitragin 93M1	- -	1960	
	3651	Nitragin 93M2	- -	1960	
	3652	Nitragin 93M4	Missouri	1960	
<u>Lespedeza hirta</u> (L.) Hornem.	3197	3G5f1	Ohio	1940	
<u>Lespedeza japonica</u> (L.) Bailey	3653	Nitragin 93N3	- -	1960	
<u>Lespedeza juncea</u> (L.f.) Pers.	3217	3G5m1, Nitragin 93C1	Ohio	1940	
	3638	3G5m2, Nitragin 93C4	Ohio	1960	
	3654	Nitragin 93P3	- -	1960	
<u>Lespedeza juncea</u> (L.f.) Pers. var. <u>sericea</u> (Miq.) Maxim. <u>sericea lespedeza</u>	3211	3G5j2	Virginia	1914	
	3212	3G5j5, Nitragin 93E5	Tennessee	1933	
	3213	3G5j6	Maryland	1940	
	3214	3G5j7	Ohio	1941	
	3399	3G5j8, ATCC 10315	- -	- -	
<u>Lespedeza juncea</u> (L.f.) Pers. var. <u>serpens</u> (Nakai) H. Ohashi	3219	3G5n2	South Carolina	1941	



<u>Lespedeza procumbens</u> Michaux perennial lespedeza	3220	3G5ol	South Carolina	1941	
<u>Lespedeza stipulacea</u> Maxim. Korean lespedeza	3204	3G5i1, Nitragin 93F1	- -	1932	
	3205	3G5i3, Nitragin 93F3	New Jersey	1933	
	3207	3G5i5	Indiana	1937	
	3208	3G5i6	Indiana	1938	
	3209	3G5i7, ATCC 10703, SEMIA 0616	Missouri	1933	
	3210	3G5i9	- -	- -	
<u>Lespedeza striata</u> (Thunb. ex Murray) Hook. & Arn.	3198	3G5gl	- -	- -	
common, Japanese, striate lespedeza	3199	3G5g3, Nitragin 93G3	Maryland	1933	
	3215	3G5kl, Nitragin 93D1	Maryland	1937	
<u>Lespedeza</u> spp. lespedezas	3400	- -	New York	- -	
<u>Leucaena leucocephala</u> (Lam.) de Wit leadtree, jumbie bean, ipil ipil	3404	NifTAL 1145, CIAT 1967	Colombia	1979	Recommended
	3405	Nitragin 94A2	- -	1950	Also effective on <u>Coronilla varia</u>
	3406	Nitragin 94A3, CB 81, RCR 3878, NifTAL 582, SEMIA 0645	Australia	1954	
	3408	Nitragin 94A6, NifTAL 995	Philippines	1978	Effective on <u>C. varia</u>
	3409	Nitragin 94A7, NifTAL 996	Philippines	1978	Effective on <u>C. varia</u>
	3493	MPI 3031, UMKL 19	- -	- -	
	3494	MPI 3032, NGR 14/1	- -	- -	
	3495	MPI 3033, NGR 63	- -	- -	
	3496	MPI 3034, NGR 71	- -	- -	
	3497	3F2f1, MPI 3036, NifTAL 21, Nitragin 94A1	- -	1950	
	3498	MPI 3038, NifTAL 595	Hawaii	- -	
	3501	MPI 3041, NifTAL 996	Philippines	- -	
<u>Lotononis bainesii</u> Baker	3412	CB 326	- -	- -	
	3413	Nitragin 97A8	- -	1973	

Table 1

Host legumes with USDA accession numbers for Rhizobium strains—Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Lotus angustissimus</u> L.	3082	3E0j1	Maryland	1946	
	3083	3E0j2	Maryland	1946	
<u>Lotus arenarius</u> Brot.	3414	- -	Morocco	1974	
<u>Lotus corniculatus</u> L. birdsfoot trefoil	3066	3E0a1, Nitragin 95C1	- -	1939	
	3067	3E0a2	- -	1939	
	3068	3E0a3	Ohio	1941	
	3069	3E0a4, Nitragin 95C4	Virginia	1919	
	3070	3E0a5, ATCC 10326, Nitragin 95C5	California	1916	
	3071	3E0a6	California	1949	
	3072	3E0a7, SEMIA 0807	Illinois	1953	
	3072a	3E0a7a, SEMIA 0817	Illinois	1953	
	3073	3E0a8, SEMIA 0809	Minnesota	1954	
	3074	3E0a9, Nitragin 95C9	Minnesota	1954	
	3075	3E0a10	Minnesota	1954	
	3076	3E0a11	Minnesota	1954	
	3076a	3E0a11a	Minnesota	1954	
	3077	3E0a12	New York	1961	
	3078	3E0a13, Brazil 805	Brazil	1964	
	3079	3E0a14, Brazil 816	Brazil	1964	
	3415	Brazil 806	Brazil	- -	
	3417	Brazil 823	Uruguay	- -	
	3418	3E0a15	- -	- -	
	3471	NZP 2213, ATCC 33669	- -	- -	
	3669	Nitragin 95C15	California	1968	
<u>Lotus corniculatus</u> L. var. <u>tenuifolius</u> L. narrow-leaf trefoil	3419	Brazil 825	Brazil	- -	

<u>Lotus hirsutus</u> L.	3608	Nitragin 45A3	--	1963
	3609	Nitragin 45A4	--	1963
	3610	Nitragin 45A5	--	1963
	3611	Nitragin 45A6	--	1963
<u>Lotus ornithopodioides</u> L.	3088	3E0o1	Maryland	1946
<u>Lotus palustris</u> Willd.	3081	3E0i2	Maryland	1946
<u>Lotus pedunculatus</u> Cav.	3469	NZP 2309, CC 8145, PDD 4681	--	--
	3503	MPI 4001, NZP 2037	--	--
<u>Lotus purshianus</u> (Benth.) Clements & E.S. Clements	3664	3E0b4, Nitragin 95A1	--	1952
<u>Lotus rectus</u> L.	3085	3E011	Maryland	1946
	3086	3E012	Maryland	1946
	3087	3E013	Turkey	--
<u>Lotus salsuginosus</u> E. Greene	3676	Nitragin 95G1	California	1977
<u>Lotus suaveolens</u> Pers.	3084	3E0k1	Maryland	1946
	3468	NZP 2037	New Zealand	1961
<u>Lotus subpinnatus</u> Lagasca	3920	--	California	1982
	3921	--	California	1982
	3922	--	California	1982
	3923	--	California	1982
	3924	--	California	1982
	3925	--	California	1982
<u>Lotus uliginosus</u> Schk. big trefoil	3470	3E0c4, ATCC 10325, Nitragin 95E4	--	--

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain		Geographical sources	Year	Comments
	accession numbers	Synonyms			
<u>Lupinus albus</u> L. white lupine	3040	3C2b1, Nitragin 96A1	Florida	1940	
	3041	3C2b2, Nitragin 96A2	Georgia	1941	
	3042	3C2b3	Yugoslavia	1955	
<u>Lupinus angustifolius</u> L. European blue lupine	3051	3C2e1, ATCC 10319	Georgia	1946	
	3052	3C2e2	Georgia	1940	
	3053	3C2e3	Florida	1941	
	3054	3C2e4	Georgia	1952	
	3054a	3C2e4a, SEMIA 0920	Georgia	1952	
	3055	3C2e5, Nitragin 96B5	Florida	1952	
<u>Lupinus densiflorus</u> Benth.	3063	3C2n1	California	1952	
	3063a	3C2n1a	California	1952	
<u>Lupinus luteus</u> L. European yellow lupine	3044	3C2d1, Nitragin 96E1	Florida	1946	
	3045	3C2d2, ATCC 10318	Florida	1946	
	3046	3C2d3	Georgia	1946	
	3047a	3C2d4a, Nitragin 96E4	Florida	1952	
	3048	3C2d5, Brazil 13-909, Nitragin 96E5	Brazil	1959	
	3049	3C2d6, Brazil 13-910	Brazil	1960	
<u>Lupinus mutabilis</u> Sweet	3504	MPI 1001, NUS 45	--	--	
<u>Lupinus nanus</u> subsp. <u>latifolius</u> (Benth.) D. Dunn	3713	Nitragin 96K3	California	1972	
	3714	Nitragin 96K4	California	1972	
	3715	Nitragin 96K5	California	1972	
<u>Lupinus perennis</u> L. wild lupine	3043	3C2c2	Maryland	1941	

<u>Lupinus polyphyllus</u> Lindley	3709	3C2f3, Nitragin 96G3	- -	1945	
	3710	Nitragin 96G5	- -	1973	
<u>Lupinus subcarnosus</u> Hook.	3057a	3C2h2a	Florida	1946	
Texas lupine, bluebonnet	3711	3C2h1	Texas	1944	
	3712	Nitragin 96H3	Texas	1947	
<u>Lupinus succulentus</u> Douglas ex K. Koch	3716	Nitragin 96M1	California	1973	
	3717	Nitragin 96M4	California	1973	
<u>Lupinus</u> spp.	3058	3C2k1	- -	1930	
lupines	3059	3C2k2	- -	1929	
	3060	3C2k4	- -	- -	
	3061	3C2k5	- -	- -	
	3062	3C2k6	California	1952	
<u>Macroptilium erythroloma</u> (C. Martius ex Benth.) Urban	3420	CB 1717	Brazil	- -	
<u>Macroptilium heterophyllum</u> (Willd.) Marechal & Baudet	3760	Nitragin 127Pl	Arizona	1979	
<u>Macrotyloma africanum</u> (Brenan ex R. Wilczek) Verdc.	3451	CB 756, NifTAL 309, RCR 3824, IITA 1002, ACCC 14076	Marandellas, Zimbabwe	1960	Broad spectrum strain
	3454	CB 756 ST	Marandellas, Zimbabwe	1960	Streptomycin and spectinomycin resistant
<u>Macrotyloma uniflorum</u> (Lam.) Verdc. horse gram	3300	3I6t1	Arizona	1950	
	3301	3I6t2	Arizona	1950	
	3301a	3I6t2a	Arizona	1950	
	3302	3I6t4	Arizona	1950	
	3302a	3I6t4a	Arizona	1950	
	3460	NifTAL 310, CB 1024, CIAT 111, SEMIA 6038	Coimbatore, India	- -	

Table 1  
Host legumes with USDA accession numbers for Rhizobium strains---Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Maniltoa grandiflora</u> (A. Gray) R. Scheffer	3506	MPI 3043, NUS 25	- -	- -	
<u>Medicago arabica</u> (L.) Hudson spotted burclover	1054 1056 1067	3D0c2, Nitragin 102A2 3D0c5 3D0e1	- - Florida Alabama	1937 1939 1939	
<u>Medicago arborea</u> L.	1171	Nitragin 102N2	Tunisia	1984	
<u>Medicago ciliaris</u> (L.) Krockner	1169	Nitragin 102K2	Tunisia	1980	
<u>Medicago laciniata</u> (L.) Miller	1170	Nitragin 102L4	Tunisia	1982	
<u>Medicago lupulina</u> L. black medic	1041 1042 1043 1045 1046 1047 1048 1049 1051 1052a 1097	3D0b1 3D0b2 3D0b3, Nitragin 102C3 3D0b5 3D0b6, SEMIA 0113 3D0b7 3D0b8 3D0b9 3D0b11 3D0b12a 3D0b10	Alabama Virginia - - Florida Florida Florida Florida Florida Florida Florida North Dakota	1936 1911 1941 1940 1944 1946 1946 1946 1952 1952 1948	Ineffective          Recommended
<u>Medicago orbicularis</u> (L.) Bartal. buttonclover	1068 1069 1098	3D0f1, Nitragin 102D1 3D0f2, Nitragin 102D3 - -	Tennessee Tennessee Morocco	- - 1948 1974	



<u>Medicago polymorpha</u> L. var. <u>vulgaris</u> (Benth.) Shinnors California burclover	1059	3D0d2	California	1938	
	1060	3D0d4, ATCC 10310, Nitragin 102B4	Florida	1939	
	1062	3D0d6, SEMIA 0114	Florida	1939	
	1066	3D0d10	Turkey	1952	
	1100	- -	Morocco	1974	
	1103	- -	Morocco	1974	
	1104	- -	Morocco	1974	
	1105	- -	Morocco	1974	
	1135	Nitragin 102B9	California	1976	
	1136	Nitragin 102B10	California	1976	
<u>Medicago rugosa</u> Desr.	1167	Nitragin 102H1	Thala, Tunisia	1980	
	1168	Nitragin 102H2	Thala, Tunisia	1980	
<u>Medicago sativa</u> L. subsp. <u>falcata</u> (L.) Arcang.	1092	3D0n2	North Dakota	1948	
	1093	3D0n3	Alaska	1949	
<u>Medicago sativa</u> L. subsp. <u>sativa</u> alfalfa, lucerne	1002	3D0a2, ATCC 9930	Virginia	1919	
	1005	3D0a5, ATCC 10312, Nitragin 102F5	- -	1927	
	1006	3D0a6, Nitragin 102F6	Maryland	1933	
	1007	3D0a7	Minnesota	1932	
	1008	3D0a8	Maryland	1933	
	1010	3D0a10, Nitragin 103, ACCC 17501	- -	1926	
	1011	3D0a11	Maryland	1933	Recommended
	1018	3D0a18	California	1940	
	1020a	3D0a20a, SEMIA 0125	North Dakota	1948	
	1021a	3D0a21a	North Dakota	1948	Recommended
	1022	3D0a22, SEMIA 0112	- -	1935	
	1023	3D0a23	South Carolina	1948	
	1024a	3D0a24a	Africa	1950	
	1025	3D0a25	Arizona	1949	Recommended
	1026	3D0a26	- -	1932	
	1027	3D0a27	Turkey	1952	
	1028a	3D0a28a	Turkey	1952	
	1029	3D0a29	Turkey	1952	
	1030	3D0a30	Turkey	1952	
	1031	3D0a31	Turkey	1952	
	1035	3D0a35	Minnesota	1959	

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Medicago sativa</u> subsp. <u>sativa</u> (con.)	1106	3D0a15, ATCC 10311	California	1939	
	1107	Brazil 134	Brazil	--	
	1108	Brazil 135	Brazil	--	
	1181	MPI 5001, L-5-30	--	--	
<u>Medicago truncatula</u> Gaertner barrelclover	1164	Nitragin 102G2	Australia	1962	
	1165	Nitragin 102G3	Australia	1970	
	1166	Nitragin 102G4	Australia	--	
<u>Medicago</u> spp. medicagos	1096	3D0o2	Turkey	1949	
	1111	--	Morocco	1974	
	1113	--	Morocco	1974	
<u>Melilotus alba</u> Medikus white sweetclover	1072	3D0h1	Virginia	1916	
	1074	3D0h3	Virginia	1925	
	1075	3D0h4	Washington, DC	1920	
	1076	3D0h5	Washington, DC	1922	
	1079	3D0h8	Virginia	1923	
	1080	3D0h11	Virginia	1932	
	1081	3D0h12	Washington, DC	1937	
	1082	3D0h13, SEMIA 0115	--	1941	
	1083	3D0h14	Florida	1952	
<u>Melilotus indica</u> (L.) All. sourclover, Indian sweetclover	1175	Nitragin 104B6	Arizona	1975	
<u>Melilotus officinalis</u> Lam. yellow sweetclover	1088	3D0i4, SEMIA 0116	Oklahoma	1948	
<u>Melilotus</u> spp. sweetclovers	1091	3D0m2	Florida	1950	

<u>Mimosa pudica</u> L.	3507	MPI 3045, WBS 4	- -	- -
sensitive plant	3508	MPI 3046, NUS 54	- -	- -
	3975	- -	Taiwan	1976
	3976	- -	Taiwan	1976
	3977	- -	Taiwan	1976
<u>Mucuna novoguineensis</u> R. Scheffer	3720	Nitragin 110B2	Trinidad	1965
<u>Mucuna pruriens</u> (L.) DC. var. <u>utilis</u>	3294	3I6p1	Virginia	1916
(Wallich ex Wright) Baker ex Burck	3295	3I6p2	Virginia	1918
	3296	3I6q1	Virginia	1915
	3297	3I6q2	Virginia	1919
	3299	3I6s1	Virginia	1919
	3439	3I6q3	- -	- -
<u>Neonotonia wightii</u> (Graham ex Arn.)	3395	Nitragin 61B14	Matão, Brazil	1974
Lackey	3421	Brazil 656	- -	- -
perennial glycine				
<u>Neptunia oleracea</u> Lour.	3995	- -	Thailand	1977
	3999	- -	Thailand	1977
	4000	- -	Thailand	1977
	4002	- -	Thailand	1977
<u>Onobrychis transcaucasica</u> Grosch.	3736	Nitragin 116B3	- -	1965
<u>Onobrychis viciifolia</u> Scop.	3172	3G2c2	Oregon	1942
sainfoin	3173	3G2c4	Idaho	1968
<u>Ononis alopecuroides</u> L.	3737	Nitragin 119A3	- -	1975
	3738	Nitragin 119A4	- -	1975
<u>Ornithopus sativus</u> Brot.	3154	3G1a1	Portugal	1947
serradella	3156	3G1a3	Florida	1947
	3157	3G1a4, Brazil 13-901	Brazil	1959
	3158	3G1a5, Brazil 13-911	Brazil	1959

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Oxytropis arctica</u> R. Br. var. <u>koyukukensis</u> (A. Pors.) Welsh	4004	- -	Alaska	1962	
<u>Oxytropis campestris</u> var. <u>varians</u> (Rydb.) Barneby	4008	- -	Alaska	1963	
<u>Oxytropis deflexa</u> (Pallas) DC.	4005	- -	Alaska	1963	
	4007	- -	Alaska	1963	
<u>Oxytropis deflexa</u> (Pallas) DC. var. <u>foliolosa</u> (Hook.) Barneby	4003	- -	Alaska	1962	
	4006	- -	Alaska	1963	
<u>Oxytropis glabra</u> (Lam.) DC.	4009	- -	- -	1963	
<u>Oxytropis riparia</u> Litv.	3119	3F6a2	Washington, DC	1937	
	3120	3F6a3	Washington, DC	1937	
	3121	3F6a4	Washington, DC	1937	
<u>Pachyrhizus erosus</u> (L.) Urban yam bean	3422	Nitragin 120B4	Thailand	1978	
	3423	Nitragin 120B5	Thailand	1978	
	3424	Nitragin 120B6	Thailand	1978	
	3425	Nitragin 120C2	- -	- -	
<u>Phaseolus acutifolius</u> A. Gray tepary bean	3250	3I6a1	- -	- -	
	3251	3I6a2	Virginia	1919	
	3252	3I6a3	Arizona	1948	
	3253	3I6a4	Arizona	1948	
	3254	3I6a5	Arizona	1948	
	3255	3I6a6	Arizona	1948	

<u>Phaseolus grayanus</u> Wooton & Standley	4031	- -	Arizona	1980	
	4032	- -	Arizona	1980	
	4033	- -	Arizona	1980	
	4034	- -	Arizona	1980	
	4035	- -	Arizona	1980	
<u>Phaseolus lunatus</u> L. limabean	3256	3I6d1	Illinois	1941	
	3257	3I6d2	Ohio	1939	
	3258	3I6d7	New Jersey	1940	
	3259	3I6d9, Nitragin 127E9	Illinois	1940	Recommended
	3260	3I6d18	Illinois	1940	
	3261	3I6d23	Washington	1948	
	3313	Nitragin 127E10	Illinois	1940	
	3314	Nitragin 127E12	Illinois	1941	
	3315	Nitragin 127E16	Nigeria	1975	
	3316	Nitragin 127E17	Nigeria	1975	
	3319	NIFTAL 22, SEMIA 6034	Hawaii	1975	
	3426	3I6d3, ATCC 10244	- -	- -	
<u>Phaseolus ritensis</u> M.E. Jones	4023	- -	Arizona	1980	
	4024	- -	Arizona	1980	
	4025	- -	Arizona	1980	
	4026	- -	Arizona	1980	
	4027	- -	Arizona	1980	
	4028	- -	Arizona	1980	
	4029	- -	Arizona	1980	
<u>Phaseolus vulgaris</u> L. green, pinto, garden, and kidney bean	2667	3I6c14, ATCC 14483, SEMIA 0430	Washington	1948	Recommended
	2668	3I6c15, ATCC 14482	- -	1959	
	2669	RCR 3605, CC 511, SEMIA 0476	- -	- -	Recommended
	2670	RCR 3610, SEMIA 0490, Nitragin 127K14	Wisconsin	1948	
	2671	RCR 3644	England	1974	
	2672	CIAT 676, RCR 3620	- -	- -	
	2673	CIAT 905, SEMIA 0491, Nitragin 127K17	Wisconsin	1948	Ineffective
	2674	Brazil 484	Brazil	- -	Recommended
	2675	Brazil 491	- -	- -	

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Phaseolus vulgaris</u> (con.)	2676	CIAT 166	Colombia	1972	Recommended
	2677	- -	Maryland	1980	
	2678	- -	Maryland	1980	
	2679	- -	Maryland	1980	
	2680	Kim 5	Idaho	- -	
	2681	NAPB 132-4	Michigan	1972	
	2682	NAPB 132-51	New Mexico	1978	
	2683	NifTAL 182, SEMIA 4021	Hawaii	1976	
	2684	UMR 1071	- -	- -	
	2685	RCR 3618, RP 11, MPI 7001	- -	1962	
	2686	3I6c3, Nitragin 127K3	Wisconsin	- -	
	2687	3I6c4, Nitragin 127K4	- -	1939	
	2688	3I6c5, Nitragin 127K5	Washington	1939	
	2689	3I6c9, Nitragin 127K9	Wisconsin	1943	
	2691	3I6j1, Nitragin 127K21	Wisconsin	1943	
	2692	3I6j2, Nitragin 127K22	Michigan	1929	
	2693	Nitragin 127K32	Brazil	1961	
	2694	Nitragin 127K38	Mexico	1975	
	2695	Nitragin 127K50	Idaho	1977	
	2696	Nitragin 127K51	Idaho	1977	
	2697	Nitragin 127K53	Idaho	1977	
	2698	Nitragin 127K54	Idaho	1977	
	2699	Nitragin 127K55	Idaho	1977	
	2700	Nitragin 127K56	Idaho	1977	
	2701	Nitragin 127K57	Idaho	1977	
	2702	Nitragin 127K58	Idaho	1977	
	2703	Nitragin 127K63	Idaho	1977	
	2704	Nitragin 127K64	Idaho	1977	
	2705	Nitragin 127K65	Idaho	1977	
	2706	Nitragin 127K66	Idaho	1977	
	2707	Nitragin 127K68	Idaho	1977	
	2708	Nitragin 127K69	Idaho	1977	
	2709	Nitragin 127K70	Idaho	1977	
	2710	Nitragin 127K71	Idaho	1977	
	2711	Nitragin 127K74	Idaho	1977	



	2712	Nitragin 127K76	Idaho	1977	
	2713	Nitragin 127K77	Idaho	1977	
	2714	Nitragin 127K78	Idaho	1977	
	2715	Nitragin 127K79	Idaho	1977	
	2716	Nitragin 127K82	Shanghai, China	1979	
	2717	Nitragin 127K83	Harbin, China	1979	
	2718	Nitragin 127K84	Harbin, China	1979	
	2719	Nitragin 127K93	Wisconsin	1979	
	2720	Nitragin 127K94	Wisconsin	1979	
	2722	--	Honduras	1981	
	2723	--	Honduras	1980	
	2734	--	--	--	
	2735	SEMIA 481	--	--	
	2736	--	--	--	
<u>Phaseolus wrightii</u> A. Gray	3758	Nitragin 127L3	Arizona	1979	
	3759	Nitragin 127L4	Arizona	1979	
<u>Pisum sativum</u> L. garden, field pea	2364	3H0q1, SEMIA 0332	Virginia	1921	
	2365	3H0q7	Utah	1932	
	2368	3H0q11	Idaho	1932	
	2370	3H0q18, ATCC 10004, ACCC 16063, SEMIA 0320	Illinois	1933	Recommended
	2372	3H0q20	Illinois	1933	Ineffective
	2374	3H0q23	Montana	1936	
	2375	3H0q26	Finland	--	
	2376	3H0q30	--	--	
	2377	3H0q33, Nitragin 128C33	Georgia	1942	
	2379	3H0q44, ACCC 16064	Washington	1939	
	2380	3H0q45a	Iowa	1948	
	2383	3H0q48a	Iowa	1948	
	2384	3H0q49a, SEMIA 0330	Iowa	1948	
	2385	3H0q50	Iowa	1948	
	2386	3H0q51, SEMIA 0318	Yugoslavia	1955	
	2387	3H0q53	--	1959	
	2388	3H0r5	--	1927	
	2391	3H0t1	Maryland	1928	
	2393	3H0t3	Alabama	1941	
	2395	3H0t7	Alabama	1941	
	2396	3H0t8	Virginia	1926	
	2397	3H0t9	Florida	1937	
	2398	3H0t14	Virginia	1928	

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Pisum sativum</u> (con.)	2399	3H0t17	Louisiana	1929	
	2400	3H0t18	Georgia	1937	
	2401	3H0t19	Georgia	1937	
	2402	3H0t22	Yugoslavia	1955	
	2404	3H0t24	--	--	
	2405	3H0t25	--	--	
	2434	C 1204	--	--	Effective on <u>Lens culinaris</u>
	2443	MPI 6001, TOM	--	--	
	2447	3Hot4, Nitragin 128A4	Georgia	1941	
	2448	3H0t11, Nitragin 128A11	--	1946	
	2449	Nitragin 128A13	Brazil	1960	
	2450	3H0q4, Nitragin 128C4	Idaho	1947	
<u>Prosopis chilensis</u> (Molina) Stuntz algaroba, mesquite	3499	MPI 3039, NiftAL 600	Hawaii	1977	
	3500	MPI 3040, NiftAL 604	Hawaii	--	
<u>Prosopis juliflora</u> (Sw.) DC. var. <u>juliflora</u>	3427	--	--	--	
<u>Psophocarpus palustris</u> Desv.	3428	Nitragin 132A1	Ibadan, Nigeria	1975	
	3429	Nitragin 132A2	Ibadan, Nigeria	1975	
	3430	Nitragin 132A3	Ibadan, Nigeria	1975	
	3431	Nitragin 132A4	Ibadan, Nigeria	1975	
<u>Psophocarpus tetragonolobus</u> (L.) DC. winged-bean	3307	SEMIA 6057	Maryland	1978	
	3308	SEMIA 6058	Maryland	1978	
	3309	SEMIA 6059	Maryland	1978	
	3310	SEMIA 6060	Maryland	1978	
	3311	SEMIA 6061	Maryland	1978	
<u>Psoralea psoralioides</u> (Walter) Cory	3100	3F2k1	--	1942	

<u>Psoralea</u> spp. scurf peas	3432 3433 3434	Nitragin 129Z1 Psoralea 249c Psoralea 249Sc	India -- --	1946 -- --
<u>Pterocarpus officinalis</u> Jacq.	4050	--	Trinidad	1963
<u>Pueraria lobata</u> (Willd.) Ohwi kudzu	3244 3246 3247 3435	3I4a8 3I4a10 3I4a11 3I4a4	South Carolina Maryland -- --	1939 -- 1959 --
<u>Pueraria montana</u> (Lour.) Merr.	3615 3616 3617 3618	Nitragin 61B2 Nitragin 61B4 Nitragin 61B5 Nitragin 61B6	-- -- -- --	1961 1961 1961 1961
<u>Pueraria phaseoloides</u> (Roxb.) Benth. tropical kudzu	3761	3I4c3, Nitragin 130A2	Puerto Rico	1946
<u>Pueraria phaseoloides</u> (Roxb.) Benth. var. <u>javanica</u> (Benth.) Baker	3764 3765	Nitragin 130C2 Nitragin 130C3	Matão, Brazil Matão, Brazil	1974 1974
<u>Rhynchosia minima</u> (L.) DC.	3776	Nitragin 136B3	Texas	1968
<u>Robinia hispida</u> L.	3777	Nitragin 137A1	Iowa	1955
<u>Robinia pseudoacacia</u> L. black locust	3112 3113 3115 3436	3F4b4 3F4b5 3F4b8 3F4b3, ATCC 10320	Virginia Pennsylvania Virginia --	1933 1931 1935 --
<u>Robinia purpurea</u> Hort. ex Link	4059 4060 4062	-- -- --	Thailand Thailand Thailand	1977 1977 1977

Table 1  
Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Sesbania emerus</u> (Aublet) Urban	3785	Nitragin 145D1	- -	1980	
	3786	Nitragin 145D3	- -	1981	
<u>Sesbania macrocarpa</u> Muhlenb.	3110	3F4a3	Maryland	1938	
<u>hemp sesbania</u>	3111	3F4a4	- -	- -	
	3781	Nitragin 145A6	Mississippi	1953	
	3782	Nitragin 145A7	Mississippi	1953	
	3783	Nitragin 145A8	Mississippi	1953	
	3784	Nitragin 145A9	Mexico	1973	
<u>Sesbania sesban</u> (L.) Merr.	4066	- -	Philippines	1962	
<u>Sesbania sesban</u> (L.) Merr. subsp.	3511	MPI 3052, WBM 11	- -	- -	
<u>punctata</u> (DC.) J.B. Gillett	3512	MPI 3054, WBM 13	- -	- -	
	3513	MPI 3055, WBM 14	- -	- -	
<u>Sesbania tetraptera</u> Hochst. ex Baker	3117	3F4c1	Zimbabwe	1953	
<u>Sophora arizonica</u> S. Watson	3790	Nitragin 146B4	New Mexico	1975	
	3791	Nitragin 146B5	New Mexico	1975	
<u>Sophora secundiflora</u> (Ortega)	3788	Nitragin 146A2	- -	1973	
<u>Lagasca</u> ex DC.	3789	Nitragin 146A3	- -	1973	
<u>mescalbean</u>					
<u>Sphenostylis stenocarpa</u> (Hochst. ex A. Rich.) Harms	3437	Nitragin 143A1	Ibadan, Nigeria	1975	
African yam bean, yam pea	3438	Nitragin 143A2	Ibadan, Nigeria	1975	

<u>Strophostyles helvola</u> (L.) Elliott	3270	3I612	Maryland	1939
trailing wild bean, peavine	3271	3I613	Virginia	1919
<u>Strophostyles leiosperma</u> (Torrey & A. Gray) Piper	3272	3I6ml	North Dakota	1948
	3272a	3I6mla	North Dakota	1948
<u>Stylosanthes fruticosa</u> (Retz.) Alston	4076	- -	Brazil	1974
<u>Stylosanthes guianensis</u> (Aublet) Sw.	3441	CB 1650, IITA 1004, ACCC 14078	Matão, Brazil	- -
Brazilian lucerne	3477	NIFTAL 658, CIAT 71	Huila, Colombia	1976
<u>Stylosanthes hamata</u> (L.) Taubert	3802	Nitragin 150D3	- -	1973
Caribbean stylosanthes	3803	Nitragin 150D4	- -	1973
	3804	Nitragin 150D5	- -	1973
	3805	Nitragin 150D6	- -	1973
	3807	Nitragin 150D8	- -	1973
	3808	Nitragin 150D9	- -	1973
	3809	Nitragin 150D11	- -	1973
<u>Tephrosia senna</u> Kunth	3108	3F3f2b	Maryland	1948
	3444	3F3f2	Maryland	1948
<u>Tephrosia villosa</u> (L.) Pers.	3442	- -	- -	- -
<u>Tephrosia virginiana</u> (L.) Pers.	3103	3F3b1	Maryland	1939
<u>Tephrosia vogelii</u> Hook. f.	3106	3F3e1	Washington, DC	1935
	3810	Nitragin 160B1	- -	1958
	3811	Nitragin 160B2	- -	1958
<u>Tephrosia</u> spp.	3443	3F3f1	Ethiopia	1948
<u>Teramus repens</u> (Taubert) Baker f.	4079	- -	Africa	1977

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Trifolium affine</u> C. Presl.	2309	Nitragin 164A2	1973	- -	
<u>Trifolium alexandrinum</u> L. berseem clover	2099	3Dlr1, ATCC 14481, SEMIA 0249, Nitragin 162B1	- -	- -	
	2101	3Dlr3, Nitragin 162B3	- -	- -	
	2128	3Dlr4, SEMIA 0246	- -	- -	
	2129	Nitragin 162B10	Tunisia	1980	
	2130	Nitragin 162B11	Tunisia	1981	
	2131	Nitragin 162B12	Tunisia	1981	
<u>Trifolium amabile</u> Kunth	2132	Nitragin 162AA1	Quito, Ecuador	1976	
	2133	Nitragin 162AA2	Quito, Ecuador	1976	
<u>Trifolium ambiguum</u> M. Bieb. kura clover	2126	3Dly8, Nitragin 162C3	Turkey	1952	
	2134	Nitragin 162C11, CC 229, RCR 204	- -	1974	
	2135	Nitragin 162C13, CC 283 B	Russia	1976	
	2180	Nitragin 162C7	Missouri	1961	
	2181	Nitragin 162C8	Missouri	1961	
	2182	Nitragin 162C9	West Virginia	1972	
<u>Trifolium arvense</u> L. rabbitfoot clover	2013	3Dld3	Maryland	1929	
<u>Trifolium aureum</u> Pollich hop clover	2077	3Dlo1	Georgia	1946	
	2078	3Dlo3	Maryland	1941	
<u>Trifolium beckwithii</u> Brewer ex S. Watson	2038	3Dlj12	Montana	1949	



<u>Trifolium berytheum</u> Boiss. & Blanche	2310	Nitragin 164B2	- -	1973	
<u>Trifolium boissieri</u> Guss. ex Soyer-Will. & Godron	2311	Nitragin 164D2	- -	1973	
<u>Trifolium burchellianum</u> Ser. subsp. <u>johnstonii</u> (Oliver) J.B. Gillett	2010	3D1c1	- -	1921	
<u>Trifolium campestre</u> Schreber large hop clover	2080	3D1p3	Texas	1940	
	2081	3D1p4	Florida	1940	
	2082	3D1p5	Louisiana	1940	
	2083	3D1p6	Tennessee	1940	
<u>Trifolium carolinianum</u> Michaux	2020	3D1h1	Florida	1952	
	2021	3D1h2	Louisiana	1952	
<u>Trifolium dasyphyllum</u> Torrey & A. Gray	2186	Nitragin 162D3	Colorado	1982	
<u>Trifolium diffusum</u> Ehrh.	2321	- -	Florida	1964	
<u>Trifolium dubium</u> Sibth. small hop clover	2124	3D1x3	Florida	1937	
<u>Trifolium echinatum</u> M. Bieb.	2332	- -	Florida	1964	
	2333	- -	Florida	1964	
<u>Trifolium fragiferum</u> L. strawberry clover	2113	3D1v3	South Carolina	1953	
	2137	3D1v1a, Nitragin 162E1	Mississippi	1938	
	2138	3D1v4	- -	- -	Ineffective
	2188	3D1v2, Nitragin 162E2	Washington	1938	
	2189	Nitragin 162E3	California	1976	
	2190	Nitragin 162E4	California	1976	
	2191	Nitragin 162E6	California	1976	
	2192	Nitragin 162E9	California	1976	
	2193	Nitragin 162E11	Tunisia	1981	

Table 1  
Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Trifolium fragiferum</u> (con.)	2194	Nitragin 162E14	Habibia, Tunisia	1982	
	2195	Nitragin 162E18	Mateur, Tunisia	1982	
	2196	Nitragin 162E21	Sidi Mahrig, Tunisia	1982	
<u>Trifolium globosum</u> L.	2313	Nitragin 164G2	- -	1973	
<u>Trifolium glomeratum</u> L. cluster clover	2104	3Dlt1	Mississippi	1938	
	2105	3Dlt3	Mississippi	1934	Ineffective
	2106	3Dlt4	Mississippi	1934	
<u>Trifolium heldreichianum</u> (Gibelli & Belli) Hausskn.	2139	Nitragin 162FF1	Kentucky	1976	
	2140	Nitragin 162FF2	Kentucky	1976	
	2197	Nitragin 162FF3	Kentucky	1976	
<u>Trifolium hirtum</u> All. rose clover	2001	3Dla1	Florida	1946	
	2003	3Dla3	Florida	1946	
	2004	3Dla4	Georgia	1946	
	2198	Nitragin 162G1	California	1951	
	2199	Nitragin 162G3	Greece	1967	
	2200	Nitragin 162G6	California	1972	
	2201	Nitragin 162G8	California	1972	
	2202	Nitragin 162G9	California	1972	
	2203	Nitragin 162G10	California	1972	
	2204	Nitragin 162G11	California	1972	
	2205	Nitragin 162G14	California	1973	
	2206	Nitragin 162G17	California	1973	
	2207	Nitragin 162G18	California	1974	
	2208	Nitragin 162G20	California	1975	
	2209	Nitragin 162G21	California	1975	
	2210	Nitragin 162G23	California	1975	
	2211	Nitragin 162G24	California	1975	

<u>Trifolium hybridum</u> L.	2060	3D114	- -	- -	Ineffective
alsike clover	2061	3D115	Turkey	1949	
	2213	Nitragin 162H1	Wisconsin	1938	
<u>Trifolium incarnatum</u> L.	2086	3D1q9	South Carolina	1953	
crimson clover	2087	3D1q10	Georgia	1939	
	2088	3D1q22	- -	1954	
	2090a	3D1q25a, ATCC 14484	- -	- -	
	2091	3D1q26	- -	1954	
	2092a	3D1q27a	- -	1954	
	2093	3D1q28	- -	1954	
	2094	3D1q29	- -	1954	
	2141	Brazil 200a	- -	- -	
	2214	3D1q2, Nitragin 162K2	Florida	1948	
	2215	3D1q7, Nitragin 162K7	Florida	1948	
<u>Trifolium kingii</u> S. Watson subsp. <u>productum</u> (Greene) D. Heller	2039	3D1j13	Montana	1949	
<u>Trifolium lappaceum</u> L.	2019	3D1gl	South Carolina	1940	
lappa clover					
<u>Trifolium medium</u> L.	2042	3D1j16	North Dakota	1949	
zigzag clover	2043	3D1j16a	North Dakota	1949	
<u>Trifolium meduseum</u> Blanche ex Boiss.	2314	Nitragin 164H2	- -	1973	
<u>Trifolium michelianum</u> Savi	2023	3D1i1	Florida	1946	
	2024	3D1i2	South Carolina	1954	
	2219	Nitragin 162L3	Alabama	1959	
<u>Trifolium mutabile</u> Portenschlag	2315	Nitragin 164K2	- -	1973	
<u>Trifolium nigrescens</u> Viv.	2006	3D1b1	Florida	1946	
ball clover	2007	3D1b2	South Carolina	1946	
	2008	3D1b3	Florida	1946	

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Trifolium nigrescens</u> Viv. subsp. <u>petrisavii</u> (Clementi) Holmboe	2324 2325	-- --	Florida Florida	1964 1964	
<u>Trifolium obscurum</u> Savi	20,001 20,002	-- --	Florida Florida	1964 1964	
<u>Trifolium ochroleucum</u> Hudson	2045	3D1j19, Nitragin 162C4	Turkey	1952	
<u>Trifolium pallidum</u> Waldst. & Kit.	2317	Nitragin 164M2	--	1973	
<u>Trifolium parryi</u> A. Gray	20,086 20,087 20,088	-- -- --	Colorado Colorado Colorado	1982 1982 1982	
<u>Trifolium pauciflorum</u> Urv.	20,041	--	Yugoslavia	1980	
<u>Trifolium philisticum</u> Zoh.	2144 2330 2331	Nitragin 164N1 -- --	-- Florida Florida	-- 1964 1964	
<u>Trifolium physodes</u> Steven ex M. Bieb.	2318	Nitragin 164P2	--	1973	
<u>Trifolium pratense</u> L. red clover	2046 2048 2050	3D1k2, ATCC 14479 3D1k5, ATCC 10328, ACCC 18006, SEMIA 0259 3D1k11, FC 178571	Virginia Illinois Finland	1934 1934 1929	

	2053	3D1k25a	- -	1958
	2054	3D1k27	- -	1963
	2055	3D1k28, SEMIA 0260	Maryland	1964
	2056	3D1k30	Maryland	1964
	2145	3D1k22a, ATCC 14480	- -	- -
	2168	MPI 8001, RCR 403	- -	- -
	2220	Nitragin 162P36	Wisconsin	1960
	2222	Nitragin 162P41	Wisconsin	1974
	2223	Nitragin 162P45	Yugoslavia	1981
<u>Trifolium purpureum</u> Lois.	2146	Nitragin 162PP2	California	1968
	2225	Nitragin 162PP3	- -	1976
	2226	Nitragin 162PP4	- -	1976
<u>Trifolium reflexum</u> L. buffalo clover	2102	3D1s1	Mississippi	1938
	2147	Nitragin 162R1	Mississippi	1937
	2148	Nitragin 162R2	Mississippi	1937
<u>Trifolium repens</u> L. white clover, ladino	2063	3D1m5, Nitragin 162S5	Florida	1939
	2065	3D1m28	Alabama	1952
	2066	3D1m30	Georgia	1952
	2067	3D1m31a, SEMIA 0245	Mississippi	1952
	2068	3D1m33a	Georgia	1953
	2069	3D1m35	- -	1958
	2070	3D1m36	- -	1958
	2071	3D1m37	- -	1958
	2074	3D1m41, Brazil 13-204	Brazil	1961
	2149	3D1m33	Georgia	1953
	2150	- -	Morocco	1974
	2227	Nitragin 162S4	Wisconsin	1940
	2229	Nitragin 162S9	Kentucky	1947
	2230	Nitragin 162S11	Florida	1947
	2231	Nitragin 162S14	Georgia	1948
	2232	Nitragin 162S18	- -	1946
	2233	Nitragin 162S22	Mississippi	1948
	2234	Nitragin 162S25	South Carolina	1954
	2235	Nitragin 162S26	Brazil	1960
	2236	Nitragin 162S28	West Virginia	1972
	2237	Nitragin 162S29	West Virginia	1972
	2238	Nitragin 162S32	New Zealand	1975

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Trifolium repens</u> L. var. <u>biasdettii</u> (Steudel & Hochst.) Asch. & Graebner	2143 2316	Nitragin 164L1 Nitragin 164L2	- - - -	- - 1973	
<u>Trifolium resupinatum</u> L. Persian clover	2107 2108 2109 2110 2240 2241 2242	3Dlu1, SEMIA 0243 3Dlu2 3Dlu3 3Dlu5, SEMIA 0258 Nitragin 162U5 Nitragin 162U6 Nitragin 162U7	Florida Louisiana Georgia Mississippi Tunisia Tunisia Tunisia	1946 1947 1937 1941 1984 1984 1984	
<u>Trifolium rubens</u> L.	2151 2243	Nitragin 162V1 Nitragin 162V3	Médenine, Tunisia Kentucky	1984 1976	
<u>Trifolium rusbyi</u> E. Greene subsp. <u>reflexum</u> (Nelson) D. Heller & Zoh.	2040 2041	3Dlj14 3Dlj15	Montana - -	1949 1952	
<u>Trifolium semipilosum</u> Fresen. Kenya clover	20,102 20,103 20,104	- - - - - -	Kenya Kenya Kenya	1982 1982 1982	
<u>Trifolium spadiceum</u> L.	2044	3Dlj17	Turkey	1952	
<u>Trifolium spumosum</u> L.	2322	- -	Florida	1964	
<u>Trifolium striatum</u> L. striate clover	2018	3Flf1	South Carolina	1940	



<u>Trifolium subterraneum</u> L. subclover, subterranean clover	2116	3Dlw9	South Carolina	1944	Effective
	2117	3Dlw14	- -	1958	
	2152	3Dlw4a	- -	- -	Effective
	2154	Nitragin 162X42	California	1970	Ineffective
	2155	Nitragin 162X43	California	1970	Ineffective
	2156	Nitragin 162X47	California	1970	Effective and competitive
	2157	Nitragin 162X53	California	1970	Ineffective
	2158	Nitragin 162X54	California	1970	Ineffective
	2159	Nitragin 162X55	California	1970	Ineffective
	2160	Nitragin 162X95	California	1976	Effective and competitive
	2161	Nitragin 162X97	California	1978	Effective and competitive
	2162	Nitragin 162X99	Tunisia	1980	Effective and competitive
	2245	Nitragin 162X5	Georgia	1948	
	2247	Nitragin 162X15	California	1968	
	2250	Nitragin 162X22	California	1968	
	2262	Nitragin 162X41	California	1970	
	2270	Nitragin 162X56	California	1970	
	2271	Nitragin 162X57	California	1970	
	2272	Nitragin 162X59	California	1970	
	2273	Nitragin 162X61	California	1970	
	2275	Nitragin 162X64	California	1970	
	2276	Nitragin 162X65	California	1970	
	2277	Nitragin 162X66	California	1970	
	2278	Nitragin 162X70	- -	1971	
	2279	Nitragin 162X71	- -	1971	
	2280	Nitragin 162X72	- -	1971	
	2281	Nitragin 162X73	- -	1971	
	2282	Nitragin 162X74	California	- -	
	2283	Nitragin 162X75	California	1971	
	2288	Nitragin 162X85	California	1974	
	2293	Nitragin 162X93	California	1975	
	20,074	- -	Tunisia	1981	
	20,108	- -	North Carolina	1984	
	20,109	- -	North Carolina	1984	
	20,110	- -	North Carolina	1984	
	20,115	- -	North Carolina	1984	
	20,116	- -	North Carolina	1984	
	20,117	- -	North Carolina	1984	
	20,118	- -	North Carolina	1984	

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Trifolium</u> <u>tembense</u> Fresen.	2163	Nitragin 162TT1, CB 758	Australia	1963	
<u>Trifolium</u> <u>tridentatum</u> Lindley	20,094	- -	California	1982	
<u>Trifolium</u> <u>usambarense</u> Taubert	2164 2329	Nitragin 162XX1 - -	Australia Florida	1963 1964	
<u>Trifolium</u> <u>vavilovii</u> Eig.	2319	Nitragin 164Q2	- -	1973	
<u>Trifolium</u> <u>vernum</u> Philippi	2320	Nitragin 164R2	- -	1973	
<u>Trifolium</u> <u>vesiculosum</u> Savi arrowleaf clover	2165 2166 2294 2295 2296 2297 2298 2299 2300	Nitragin 162Y13 Nitragin 162Y14 Nitragin 162Y2 Nitragin 162Y3 Nitragin 162Y4 Nitragin 162Y7 Nitragin 162Y9 Nitragin 162Y11 Nitragin 162Y12	Alabama Alabama - - - - - - - - Louisiana - - - -	1974 1974 1962 1963 1963 1969 1970 1974 1974	
<u>Trifolium</u> <u>willdenovii</u> Sprengel seaside clover	2015	3D1e1, SEMIA 0250	Oregon	1938	

<u>Trifolium</u> spp. clovers	2027	3D1 j1	- -	1921
	2028	3D1 j2	- -	1920
	2029	3D1 j3	Africa	1929
	2030	3D1 j4	Turkey	1949
	2031	3D1 j5	Turkey	1949
	2032	3D1 j6	Turkey	1949
	2033	3D1 j7	Turkey	1949
	2034a	3D1 j8a	Turkey	1949
	2037	3D1 j11	- -	- -
	2167	3D1 j4a	Turkey	1949
<u>Trigonella</u> <u>balansae</u> Boiss. & Reuter	1114	3E0g1	California	1939
<u>Trigonella</u> <u>corniculata</u> (L.) L.	1115	3E0h1	California	1939
	1176	3E0h2, Nitragin 163B2	- -	1940
<u>Trigonella</u> <u>foenum-graecum</u> L. fenugreek	1177	3E0b3, Nitragin 163C3	Florida	1939
	1178	3E0b5, Nitragin 163C4	- -	1949
<u>Ulex</u> <u>europaeus</u> L. gorse	3445	Nitragin 170A2	Hawaii	1955
	4084	- -	Hawaii	1977
<u>Vicia</u> <u>americana</u> Muhlenb. ex Willd. American vetch	2334	3H0b1	California	- -
<u>Vicia</u> <u>ervilia</u> (L.) Willd. bitter vetch	2406	3H0w1	Oregon	1950

Table 1

Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain		Geographical sources	Year	Comments
	accession numbers	Synonyms			
<u>Vicia faba</u> L. broadbean, horsebean	2356	3H0g3	- -	1960	
	2357	3H0g4	- -	1960	
	2435	NifTAL 167, SEMIA 0387, Nitragin 175F1	Holland	1955	
	2475	Nitragin 175F3	- -	1971	
	2476	Nitragin 175F4	- -	1971	
	2477	Nitragin 175F7	- -	1973	
	2478	Nitragin 175F11	Morocco	1978	
	2479	Nitragin 175F12, NifTAL 1399	Canada	1978	
	2488	Nitragin 175F10	- -	- -	
	2489	Nitragin 175F16, NifTAL 1400	- -	- -	
	2490	Nitragin 175F19	- -	- -	
<u>Vicia grandiflora</u> Scop. var. <u>kitaibeliana</u> Koch showy vetch, big flower vetch	2361	3H0o1	Alabama	1940	
<u>Vicia lutea</u> L. yellow vetch	2436	- -	Morocco	1974	
	2437	- -	Morocco	1974	
<u>Vicia monantha</u> Retz. bard vetch	2359	3H0d1, Nitragin 175H1	California	1932	
	2360	3H0j1	Alabama	1941	
<u>Vicia narbonensis</u> L. narbonne vetch	2438	3H0yla	Yugoslavia	1955	
	2439	3H0ylb	Yugoslavia	1955	

<u>Vicia sativa</u> L. subsp. <u>nigra</u> (L.)	2353	3H0h2	Washington, DC	1933
Ehrh.	2354	3H0h5a	North Carolina	1949
blackpod vetch				
<u>Vicia sativa</u> L. subsp. <u>sativa</u>	2347	3H0f1	Virginia	1921
common vetch				
<u>Vicia tenuifolia</u> Roth	2421	3H0mla	North Dakota	1951
<u>Vicia tetrasperma</u> (L.) Schreber	2440	3H0x1	Alabama	1949
sparrow vetch	2441	3H0x1b	Alabama	1949
<u>Vicia villosa</u> Roth	2335	3H0c1, ATCC 10314	Virginia	1912
hairy vetch	2336	3H0c3	Georgia	1935
	2337	3H0c4	Tennessee	1936
	2339	3H0c8	- -	- -
	2340	3H0c9	Georgia	1937
	2341	3H0c10	Georgia	1937
	2342	3H0c11	- -	- -
	2343	3H0c13, Brazil 13-310	Brazil	- -
	2480	Nitragin 175G12	Tennessee	1951
	2481	Nitragin 175G16	West Virginia	1972

Table 1  
Host legumes with USDA accession numbers for Rhizobium strains--Continued

Host legumes (scientific and common names)	USDA strain accession numbers	Synonyms	Geographical sources	Year	Comments
<u>Vicia villosa</u> Roth subsp. <u>varia</u> (Host) Corbiere	2483	Nitragin 175P5	California	1975	
<u>Vicia</u> spp. vetches	2442	CB 1447	--	--	
	2484	Nitragin 175Z2	Hawaii	1977	
	2485	Nitragin 175Z4	Hawaii	1977	
<u>Vigna aconitifolia</u> (Jacq.) Marechal moth bean	3263	3I6g1	Virginia	1917	
	3264	3I6g2	Virginia	1918	
<u>Vigna angularis</u> (Willd.) Ohwi & H. Ohashi adzuki bean	3262	3I6f1	Virginia	1917	
	3509	MPI 3049, NUS 8	--	--	
<u>Vigna mungo</u> (L.) Hepper black gram	4013	--	Taiwan	1974	
<u>Vigna radiata</u> (L.) R. Wilczek mung bean	3266	3I6h5	Virginia	1931	
	3267	3I6h6	Virginia	1933	
	3268	3I6h7	Maryland	1933	Ineffective
	3446	CB 1015, IITA 1006	India	--	
	3447	THA 301, NIFTAL 420	Thailand	1979	Recommended
	3448	NIFTAL 442, UPLB M7	Philippines	--	
	3463	NIFTAL 425, THA 306	Thailand	1979	
<u>Vigna subterranea</u> (L.) Verdc.	3834	--	Nigeria	1974	
	3835	--	Nigeria	1974	
	3836	--	Nigeria	1974	



<u>Vigna unguiculata</u> (L.) Walp. subsp. <u>sesquipedalis</u> (L.) Verdc. asparagus bean, yard-long bean	3298	3I6r1	Virginia	1917	
<u>Vigna unguiculata</u> (L.) Walp. subsp. <u>unguiculata</u> cowpea, caupi, frijol	3273	3I6n1	Wisconsin	--	
	3275	3I6n6, SEMIA 0614, Nitragin 176A6	--	--	
	3276	3I6n7	Virginia	1915	
	3277	3I6n9	Oklahoma	1929	
	3278	3I6n10, Nitragin 176A42	Virginia	1916	
	3280	3I6n12	--	1927	
	3281	3I6n15	Virginia	1914	
	3282	3I6n16, Nitragin 176A43	--	1927	
	3283	3I6n17	Wisconsin	--	
	3284	3I6n18	--	1929	
	3285	3I6n19	--	--	
	3287	3I6n21	--	--	Ineffective
	3449	3I6n4	--	--	
	3450	3I6n5	--	--	
	3456	NiftAL 169, Nitragin 176A22, SEMIA 6032	Wisconsin	1966	Recommended, also effective on <u>Arachis</u> <u>hypogaea</u> and <u>Vigna</u> <u>radiata</u>
	3457	NiftAL 173, Nitragin 176A30, SEMIA 6037	Nigeria	1975	
	3458	NiftAL 174, Nitragin 176A32	Nigeria	1975	Recommended
	3459	NiftAL 189, Nitragin 176A31	Nigeria	1975	
<u>Wisteria frutescens</u> (L.) Poiret wisteria	3104	3F3c1	Georgia	1941	
	3105	3F3d1	--	--	
<u>Zornia diphylla</u> (L.) Pers.	3464	CB 328	Australia	--	

Table 2  
Rhizobium strains by USDA accession numbers with host legumes and bacterial classification

<u>Rhizobium</u> USDA accession numbers	Host legumes	Bacterial classification <sup>1</sup>
1-190	<u>Glycine max</u>	<u>Bradyrhizobium japonicum</u>
191-217	<u>Glycine max</u>	<u>Rhizobium fredii</u>
218-256	<u>Glycine max</u>	<u>Bradyrhizobium japonicum</u>
257	<u>Glycine max</u>	<u>Rhizobium fredii</u>
258-342	<u>Glycine max</u>	<u>Bradyrhizobium japonicum</u>
1002-1035	<u>Medicago sativa</u> subsp. <u>sativa</u>	<u>Rhizobium meliloti</u>
1041-1052a	<u>Medicago lupulina</u>	
1054-1056	<u>Medicago arabica</u>	
1059-1066	<u>Medicago polymorpha</u> var. <u>vulgaris</u>	
1067	<u>Medicago arabica</u>	
1068-1069	<u>Medicago orbicularis</u>	
1072-1083	<u>Melilotus alba</u>	
1088	<u>Melilotus officinalis</u>	
1091	<u>Melilotus</u> spp.	
1092-1093	<u>Medicago sativa</u> subsp. <u>falcata</u>	
1096	<u>Medicago</u> spp.	
1097	<u>Medicago lupulina</u>	
1098	<u>Medicago orbicularis</u>	
1100-1105	<u>Medicago polymorpha</u> var. <u>vulgaris</u>	
1106-1108	<u>Medicago sativa</u> subsp. <u>sativa</u>	
1111-1113	<u>Medicago</u> spp.	
1114	<u>Trigonella balansae</u>	
1115	<u>Trigonella corniculata</u>	
1135-1136	<u>Medicago polymorpha</u> var. <u>vulgaris</u>	
1164-1166	<u>Medicago truncatula</u>	
1167-1168	<u>Medicago rugosa</u>	
1169	<u>Medicago ciliaris</u>	
1170	<u>Medicago laciniata</u>	
1171	<u>Medicago arborea</u>	
1175	<u>Melilotus indica</u>	
1176	<u>Trigonella corniculata</u>	
1177-1178	<u>Trigonella foenum-graecum</u>	
1181	<u>Medicago sativa</u> subsp. <u>sativa</u>	
2001-2004	<u>Trifolium hirtum</u>	<u>Rhizobium leguminosarum</u> biovar. <u>trifolii</u>

2006-2008	<u>Trifolium nigrescens</u>
2010	<u>Trifolium burchellianum</u> subsp. <u>johnstonii</u>
2013	<u>Trifolium arvense</u>
2015	<u>Trifolium willdenovii</u>
2018	<u>Trifolium striatum</u>
2019	<u>Trifolium lappaceum</u>
2020-2021	<u>Trifolium carolinianum</u>
2023-2024	<u>Trifolium michelianum</u>
2027-2037	<u>Trifolium</u> spp.
2038	<u>Trifolium beckwithii</u>
2039	<u>Trifolium kingii</u> subsp. <u>productum</u>
2040-2041	<u>Trifolium rusbyi</u> subsp. <u>reflexum</u>
2042-2043	<u>Trifolium medium</u>
2044	<u>Trifolium spadiceum</u>
2045	<u>Trifolium ochroleucum</u>
2046-2056	<u>Trifolium pratense</u>
2060-2061	<u>Trifolium hybridum</u>
2063-2074	<u>Trifolium repens</u>
2077-2078	<u>Trifolium aureum</u>
2080-2083	<u>Trifolium campestre</u>
2086-2094	<u>Trifolium incarnatum</u>
2099-2101	<u>Trifolium alexandrinum</u>
2102	<u>Trifolium reflexum</u>
2104-2106	<u>Trifolium glomeratum</u>
2107-2110	<u>Trifolium resupinatum</u>
2113	<u>Trifolium fragiferum</u>
2116-2117	<u>Trifolium subterraneum</u>
2124	<u>Trifolium dubium</u>
2126	<u>Trifolium ambiguum</u>
2128-2131	<u>Trifolium alexandrinum</u>
2132-2133	<u>Trifolium amabile</u>
2134-2135	<u>Trifolium ambiguum</u>
2137-2138	<u>Trifolium fragiferum</u>
2139-2140	<u>Trifolium heldreichianum</u>
2141	<u>Trifolium incarnatum</u>
2143	<u>Trifolium repens</u> var. <u>biasdettii</u>
2144	<u>Trifolium philisticum</u>
2145	<u>Trifolium pratense</u>
2146	<u>Trifolium purpureum</u>
2147-2148	<u>Trifolium reflexum</u>
2149-2150	<u>Trifolium repens</u>
2151	<u>Trifolium rubens</u>

See footnote at end of table.

Table 2

Rhizobium strains by USDA accession numbers with host legumes and bacterial classification--Continued

<u>Rhizobium</u> USDA accession numbers	Host legumes	Bacterial classification <sup>1</sup>
2152-2162	<u>Trifolium subterraneum</u>	<u>Rhizobium leguminosarum</u> biovar. <u>trifolii</u>
2163	<u>Trifolium temense</u>	
2164	<u>Trifolium usambarense</u>	
2165-2166	<u>Trifolium vesiculosum</u>	
2167	<u>Trifolium</u> spp.	
2168	<u>Trifolium pratense</u>	
2180-2182	<u>Trifolium ambiguum</u>	
2186	<u>Trifolium dasyphyllum</u>	
2188-2196	<u>Trifolium fragiferum</u>	
2197	<u>Trifolium heldreichianum</u>	
2198-2211	<u>Trifolium hirtum</u>	
2213	<u>Trifolium hybridum</u>	
2214-2215	<u>Trifolium incarnatum</u>	
2219	<u>Trifolium michelianum</u>	
2220-2223	<u>Trifolium pratense</u>	
2225-2226	<u>Trifolium purpureum</u>	
2227-2238	<u>Trifolium repens</u>	
2240-2242	<u>Trifolium resupinatum</u>	
2243	<u>Trifolium rubens</u>	
2245-2293	<u>Trifolium subterraneum</u>	
2294-2300	<u>Trifolium vesiculosum</u>	
2309	<u>Trifolium affine</u>	
2310	<u>Trifolium berytheum</u>	
2311	<u>Trifolium boissieri</u>	
2313	<u>Trifolium globosum</u>	
2314	<u>Trifolium meduseum</u>	
2315	<u>Trifolium mutabile</u>	
2316	<u>Trifolium repens</u> var. <u>biasdettii</u>	
2317	<u>Trifolium pallidum</u>	
2318	<u>Trifolium physodes</u>	
2319	<u>Trifolium vavilovii</u>	
2320	<u>Trifolium vernum</u>	
2321	<u>Trifolium diffusum</u>	
2322	<u>Trifolium spumosum</u>	

2324-2325	<u>Trifolium nigrescens</u> subsp. <u>petrisavii</u>	
2329	<u>Trifolium usambarense</u>	
2330-2331	<u>Trifolium philisticum</u>	
2332-2333	<u>Trifolium echinatum</u>	
2334	<u>Vicia americana</u>	<u>Rhizobium leguminosarum</u> biovar. <u>viceae</u>
2335-2343	<u>Vicia villosa</u>	
2347	<u>Vicia sativa</u> subsp. <u>sativa</u>	
2353-2354	<u>Vicia sativa</u> subsp. <u>nigra</u>	
2356-2357	<u>Vicia faba</u>	
2359-2360	<u>Vicia monantha</u>	
2361	<u>Vicia grandiflora</u> var. <u>kitaibeliana</u>	
2364-2405	<u>Pisum sativum</u>	
2406	<u>Vicia ervilia</u>	
2410	<u>Lathyrus sphaericus</u>	
2411-2413	<u>Lathyrus tuberosus</u>	
2414	<u>Lathyrus polymorphus</u>	
2416	<u>Lathyrus ochroleucus</u>	
2417-2419	<u>Lathyrus hirsutus</u>	
2421	<u>Vicia tenuifolia</u>	
2422	<u>Lathyrus cicera</u>	
2423-2425	<u>Lathyrus tuberosus</u>	
2426	<u>Lens culinaris</u>	
2428	<u>Lathyrus hirsutus</u>	
2429-2433	<u>Lens culinaris</u>	
2434	<u>Pisum sativum</u>	
2435	<u>Vicia faba</u>	
2436-2437	<u>Vicia lutea</u>	
2438-2439	<u>Vicia narbonensis</u>	
2440-2441	<u>Vicia tetrasperma</u>	
2442	<u>Vicia</u> spp.	
2443	<u>Pisum sativum</u>	
2444	<u>Lathyrus japonicus</u>	
2445-2446	<u>Lathyrus latifolius</u>	
2447-2450	<u>Pisum sativum</u>	
2475-2479	<u>Vicia faba</u>	
2480-2481	<u>Vicia villosa</u>	
2483	<u>Vicia villosa</u> subsp. <u>varia</u>	
2484-2485	<u>Vicia</u> spp.	
2488-2490	<u>Vicia faba</u>	
2667-2736	<u>Phaseolus vulgaris</u>	<u>Rhizobium leguminosarum</u> biovar. <u>phaseoli</u>
3001-3002	<u>Acacia decurrens</u>	<u>Bradyrhizobium</u> spp.
3003	<u>Acacia linifolia</u>	
3004-3005	<u>Albizia julibrissin</u>	



Table 2

Rhizobium strains by USDA accession numbers with host legumes and bacterial classification--Continued

<u>Rhizobium</u> USDA accession numbers	Host legumes	Bacterial classification <sup>1</sup>
3006	<u>Desmanthus illinoensis</u>	<u>Bradyrhizobium</u> spp.
3010-3014	<u>Chamaecrista fasciculata</u>	
3015	<u>Chamaecrista nictitans</u>	
3016	<u>Chamaecrista mimosoides</u>	
3017	<u>Baptisia tinctoria</u>	
3018	<u>Baptisia australis</u> var. <u>minor</u>	
3020	<u>Baptisia alba</u>	
3021-3023	<u>Crotalaria sagittalis</u>	
3024-3028	<u>Crotalaria juncea</u>	
3029	<u>Crotalaria retusa</u>	
3030	<u>Crotalaria spectabilis</u>	
3031	<u>Crotalaria alata</u>	
3032-3033	<u>Crotalaria incana</u>	
3035	<u>Crotalaria lanceolata</u>	
3036-3038	<u>Crotalaria pallida</u>	
3039	<u>Crotalaria senegalensis</u>	
3040-3042	<u>Lupinus albus</u>	
3043	<u>Lupinus perennis</u>	
3044-3049	<u>Lupinus luteus</u>	
3051-3055	<u>Lupinus angustifolius</u>	
3057a	<u>Lupinus subcarinosus</u>	
3058-3062	<u>Lupinus</u> spp.	
3063-3063a	<u>Lupinus densiflorus</u>	
3066-3079	<u>Lotus corniculatus</u>	
3081	<u>Lotus palustris</u>	
3082-3083	<u>Lotus angustissimus</u>	
3084	<u>Lotus suaveolens</u>	
3085-3087	<u>Lotus rectus</u>	
3088	<u>Lotus ornithopodioides</u>	
3089	<u>Cyamopsis tetragonoloba</u>	
3090-3093a	<u>Indigofera hirsuta</u>	
3095	<u>Dalea alopecuroides</u>	
3097	<u>Amorpha fruticosa</u>	
3098	<u>Dalea candida</u>	



3100	<u>Psoralea psoralioides</u>
3102	<u>Galega officinalis</u>
3103	<u>Tephrosia virginiana</u>
3104-3105	<u>Wisteria frutescens</u>
3106	<u>Tephrosia vogelii</u>
3108	<u>Tephrosia senna</u>
3110-3111	<u>Sesbania macrocarpa</u>
3112-3115	<u>Robinia pseudoacacia</u>
3117	<u>Sesbania tetraptera</u>
3119-3121	<u>Oxytropis riparia</u>
3123	<u>Astragalus armatus</u>
3124	<u>Astragalus falcatus</u>
3127-3129	<u>Caragana arborescens</u>
3134-3138	<u>Astragalus sinicus</u>
3139	<u>Astragalus canadensis</u>
3142-3143	<u>Astragalus hypoglottis</u>
3146	<u>Astragalus crassicaulus</u>
3147	<u>Astragalus onobrychis</u>
3149	<u>Astragalus vexilliflexus</u>
3150a	<u>Astragalus</u> spp.
3152a-3152c	<u>Astragalus mollissimus</u>
3153	<u>Astragalus</u> spp.
3154-3158	<u>Ornithopus sativus</u>
3160-3169	<u>Coronilla varia</u>
3170-3170a	<u>Coronilla cretica</u>
3171	<u>Hedysarum coronarium</u>
3172-3173	<u>Onobrychis viciifolia</u>
3174	<u>Hedysarum boreale</u>
3176	<u>Centrosema virginianum</u>
3177	<u>Aeschynomene americana</u>
3179-3188	<u>Arachis hypogaea</u>
3189-3191	<u>Desmodium tortuosum</u>
3193	<u>Desmodium cuspidatum</u>
3195	<u>Desmodium illinoense</u>
3197	<u>Lepedeza hirta</u>
3198-3199	<u>Lepedeza striata</u>
3201-3203	<u>Lepedeza capitata</u>
3204-3210	<u>Lepedeza stipulacea</u>
3211-3214	<u>Lepedeza juncea</u> var. <u>sericea</u>
3215	<u>Lepedeza striata</u>
3217	<u>Lepedeza juncea</u>
3219	<u>Lepedeza juncea</u> var. <u>serpens</u>
3220	<u>Lepedeza procumbens</u>

Table 2

Rhizobium strains by USDA accession numbers with host legumes and bacterial classification--Continued

<u>Rhizobium</u> USDA accession numbers	Host legumes	Bacterial classification <sup>1</sup>
3221-3222	<u>Lespedeza bicolor</u>	<u>Bradyrhizobium</u> spp.
3223	<u>Lespedeza cyrtobotrya</u>	
3224	<u>Desmodium canum</u>	
3225	<u>Desmodium</u> spp.	
3226-3226a	<u>Desmodium nicaraguense</u>	
3228-3237	<u>Cicer arietinum</u>	
3239	<u>Centrosema pubescens</u>	
3240	<u>Apios americana</u>	
3241	<u>Erythrina variegata</u>	
3242	<u>Erythrina speciosa</u>	
3244-3247	<u>Pueraria lobata</u>	
3250-3255	<u>Phaseolus acutifolius</u>	
3256-3261	<u>Phaseolus lunatus</u>	
3262	<u>Vigna angularis</u>	
3263-3264	<u>Vigna aconitifolia</u>	
3266-3268	<u>Vigna radiata</u>	
3270-3271	<u>Strophostyles helvola</u>	
3272-3272a	<u>Strophostyles leiosperma</u>	
3273-3287	<u>Vigna unguiculata</u> subsp. <u>unguiculata</u>	
3294-3297	<u>Mucuna pruriens</u> var. <u>utilis</u>	
3298	<u>Vigna unguiculata</u> subsp. <u>sesquipedalis</u>	
3299	<u>Mucuna pruriens</u> var. <u>utilis</u>	
3300-3302a	<u>Macrotyloma uniflorum</u>	
3304-3306	<u>Alysicarpus vaginalis</u>	
3307-3311	<u>Psophocarpus tetragonolobus</u>	
3313-3316	<u>Phaseolus lunatus</u>	
3317-3318	<u>Canavalia ensiformis</u>	
3319	<u>Phaseolus lunatus</u>	
3320-3324	<u>Faidherbia albida</u>	
3325-3326	<u>Acacia</u> spp.	
3327	<u>Acacia decurrens</u>	
3328	<u>Acacia pennatula</u>	
3329-3330	<u>Adesmia</u> spp.	
3331-3332	<u>Aeschynomene americana</u>	

3333	<u>Aeschynomene falcata</u>
3334-3335	<u>Albizia julibrissin</u>
3336	<u>Anthyllis vulneraria</u>
3337-3346	<u>Arachis hypogaea</u>
3347	<u>Arachis glabrata</u>
3348	<u>Astragalus alpinus</u>
3349-3352	<u>Astragalus cicer</u>
3353-3354	<u>Astragalus falcatus</u>
3355-3356	<u>Astragalus gummifer</u>
3357	<u>Astragalus adsurgens</u> var. <u>robustior</u>
3358	<u>Astragalus</u> spp.
3362-3364	<u>Cajanus cajan</u>
3365	<u>Calopogonium</u> spp.
3366	<u>Caragana arborescens</u>
3367-3368	<u>Centrosema pubescens</u>
3369	<u>Centrosema</u> spp.
3370-3381	<u>Cicer arietinum</u>
3382	<u>Coronilla emerus</u>
3384	<u>Crotalaria paulina</u>
3385-3386	<u>Cyamopsis tetragonoloba</u>
3387	<u>Dalea alopecuroides</u>
3388	<u>Desmodium barbatum</u>
3389	<u>Desmodium heterophyllum</u>
3390	<u>Desmodium intortum</u>
3391	<u>Desmodium tortuosum</u>
3393	<u>Galactia striata</u>
3394	<u>Galega officinalis</u>
3395	<u>Neonotonia wightii</u>
3396	<u>Indigofera hirsuta</u>
3397-3398	<u>Lablab purpureus</u>
3399	<u>Lespedeza juncea</u> var. <u>sericea</u>
3400	<u>Lespedeza</u> spp.
3404-3409	<u>Leucaena leucocephala</u>
3412-3413	<u>Lotononis bainesii</u>
3414	<u>Lotus arenarius</u>
3415-3418	<u>Lotus corniculatus</u>
3419	<u>Lotus corniculatus</u> var. <u>tenuifolius</u>
3420	<u>Macroptilium erythroloma</u>
3421	<u>Neonotonia wightii</u>
3422-3425	<u>Pachyrhizus erosus</u>
3426	<u>Phaseolus lunatus</u>
3427	<u>Prosopis juliflora</u> var. <u>juliflora</u>
3428-3431	<u>Psophocarpus palustris</u>

See footnote at end of table.

Table 2

Rhizobium strains by USDA accession numbers with host legumes and bacterial classification--Continued

<u>Rhizobium</u> USDA accession numbers	Host legumes	Bacterial classification <sup>1</sup>
3432-3434	<u>Psoralea</u> spp.	<u>Bradyrhizobium</u> spp.
3435	<u>Pueraria lobata</u>	
3436	<u>Robinia pseudoacacia</u>	
3437-3438	<u>Sphenostylis stenocarpa</u>	
3439	<u>Mucuna pruriens</u> var. <u>utilis</u>	
3441	<u>Stylosanthes guianensis</u>	
3442	<u>Tephrosia villosa</u>	
3443	<u>Tephrosia</u> spp.	
3444	<u>Tephrosia senna</u>	
3445	<u>Ulex europaeus</u>	
3446-3448	<u>Vigna radiata</u>	
3449-3450	<u>Vigna unguiculata</u> subsp. <u>unguiculata</u>	
3451	<u>Macrotyloma africanum</u>	
3452	<u>Centrosema pubescens</u>	
3454	<u>Macrotyloma africanum</u>	
3456-3459	<u>Vigna unguiculata</u> subsp. <u>unguiculata</u>	
3460	<u>Macrotyloma uniflorum</u>	
3463	<u>Vigna radiata</u>	
3464	<u>Zornia diphylla</u>	
3466	<u>Astragalus sinicus</u>	
3468	<u>Lotus suaveolens</u>	<u>Rhizobium loti</u>
3469	<u>Lotus pedunculatus</u>	<u>Bradyrhizobium</u> spp.
3470	<u>Lotus uliginosus</u>	
3471	<u>Lotus corniculatus</u>	<u>Rhizobium loti</u>
3472-3474	<u>Cajanus cajan</u>	<u>Bradyrhizobium</u> spp.
3475	<u>Acacia melanoxylon</u>	
3476	<u>Acacia stenoptera</u>	
3477	<u>Stylosanthes guianensis</u>	
3478	<u>Adenanthera pavonina</u>	
3479	<u>Brownea ariza</u>	
3480	<u>Centrosema plumieri</u>	
3481-3483	<u>Cicer arietinum</u>	
3484	<u>Desmodium canum</u>	
3485	<u>Desmodium heterophyllum</u>	

3486	<u>Desmodium intortum</u>
3487	<u>Desmodium triflorum</u>
3488	<u>Erythrina fusca</u>
3489-3490	<u>Gliricidia sepium</u>
3493-3498	<u>Leucaena leucocephala</u>
3499-3500	<u>Prosopis chilensis</u>
3501	<u>Leucaena leucocephala</u>
3503	<u>Lotus pedunculatus</u>
3504	<u>Lupinus mutabilis</u>
3506	<u>Maniltoa grandiflora</u>
3507-3508	<u>Mimosa pudica</u>
3509	<u>Vigna angularis</u>
3511-3513	<u>Sesbania sesban</u> subsp. <u>punctata</u>
3516	<u>Aeschynomene americana</u>
3518-3522	<u>Arachis hypogaea</u>
3541-3542	<u>Arachis glabrata</u>
3543-3546	<u>Astragalus cicer</u>
3547-3549	<u>Astragalus eucosmos</u>
3550-3551	<u>Astragalus flexuosus</u>
3554-3555	<u>Astragalus sinicus</u>
3556-3557	<u>Alysicarpus vaginalis</u>
3558	<u>Anagyris foetida</u>
3559-3563	<u>Cajanus cajan</u>
3570-3575	<u>Chamaecrista fasciculata</u>
3590	<u>Coronilla cretica</u>
3596	<u>Desmodium sessilifolium</u>
3597	<u>Desmodium uncinatum</u>
3598	<u>Desmodium heterocarpon</u>
3601-3604	<u>Desmodium</u> spp.
3605	<u>Lablab purpureus</u>
3607	<u>Desmanthus virgatus</u> var. <u>depressus</u>
3608-3611	<u>Lotus hirsutus</u>
3612	<u>Eriosema englerianum</u>
3613	<u>Eysenhardtia texana</u>
3615-3618	<u>Pueraria montana</u>
3620	<u>Glycyrrhiza lepidota</u>
3632	<u>Indigofera suffruticosa</u>
3633	<u>Indigofera fulvopilosa</u>
3638	<u>Lespedeza juncea</u>
3650-3652	<u>Lespedeza daurica</u>
3653	<u>Lespedeza japonica</u>
3654	<u>Lespedeza juncea</u>

See footnote at end of table.



Table 2

Rhizobium strains by USDA accession numbers with host legumes and bacterial classification--Continued

<u>Rhizobium</u> USDA accession numbers	Host legumes	Bacterial classification <sup>1</sup>
3664	<u>Lotus purshianus</u>	<u>Bradyrhizobium</u> spp.
3669	<u>Lotus corniculatus</u>	
3676	<u>Lotus salsuginosus</u>	
3709-3710	<u>Lupinus polyphyllus</u>	
3711-3712	<u>Lupinus subcarnosus</u>	
3713-3715	<u>Lupinus nanus</u> subsp. <u>latifolius</u>	
3716-3717	<u>Lupinus succulentus</u>	
3720	<u>Mucuna novoguineensis</u>	
3736	<u>Onobrychis transcaucasica</u>	
3737-3738	<u>Ononis alopecuroides</u>	
3741-3743	<u>Dalea purpurea</u>	
3744	<u>Dalea phleoides</u>	
3758-3759	<u>Phaseolus wrightii</u>	
3760	<u>Macroptilium heterophyllum</u>	
3761	<u>Pueraria phaseoloides</u>	
3764-3765	<u>Pueraria phaseoloides</u> var. <u>javanica</u>	
3776	<u>Rhynchosia minima</u>	
3777	<u>Robinia hispida</u>	
3781-3784	<u>Sesbania macrocarpa</u>	
3785-3786	<u>Sesbania emerus</u>	
3788-3789	<u>Sophora secundiflora</u>	
3790-3791	<u>Sophora arizonica</u>	
3802-3809	<u>Stylosanthes hamata</u>	
3810-3811	<u>Tephrosia vogelii</u>	
3834-3836	<u>Vigna subterranea</u>	
3838-3843	<u>Acacia constricta</u>	
3853	<u>Astragalus robbinsii</u> var. <u>harringtonii</u>	
3854-3855	<u>Astragalus americanus</u>	
3857	<u>Astragalus siliquosus</u>	
3858	<u>Astragalus aduncus</u>	
3873	<u>Desmodium barbatum</u>	
3875	<u>Desmodium adscendens</u>	
3876	<u>Hedysarum boreale</u> subsp. <u>mackenziei</u>	
3877-3878	<u>Hedysarum alpinum</u>	



3880-3882	<u>Hedysarum alpinum</u> var. <u>americanum</u>	
3883-3884	<u>Hedysarum boreale</u> subsp. <u>mackenziei</u>	
3895-3897	<u>Hippocrepis multisiliquosa</u>	
3916-3919	<u>Indigofera gracilis</u>	
3920-3925	<u>Lotus subpinnatus</u>	
3975-3977	<u>Mimosa pudica</u>	
3995-4002	<u>Neptunia oleracea</u>	
4003	<u>Oxytropis deflexa</u> var. <u>foliolosa</u>	
4004	<u>Oxytropis arctica</u> var. <u>koyukukensis</u>	
4005	<u>Oxytropis deflexa</u>	
4006	<u>Oxytropis deflexa</u> var. <u>foliolosa</u>	
4007	<u>Oxytropis deflexa</u>	
4008	<u>Oxytropis campestris</u> var. <u>varians</u>	
4009	<u>Oxytropis glabra</u>	
4013	<u>Vigna mungo</u>	
4023-4029	<u>Phaseolus ritensis</u>	
4031-4035	<u>Phaseolus grayanus</u>	
4050	<u>Pterocarpus officinalis</u>	
4059-4062	<u>Robinia purpurea</u>	
4066	<u>Sesbania sesban</u>	
4076	<u>Stylosanthes fruticosa</u>	
4079	<u>Teramus repens</u>	
4084	<u>Ulex europaeus</u>	
20,001-20,002	<u>Trifolium obscurum</u>	<u>Rhizobium leguminosarum</u> biovar. <u>trifolii</u>
20,041	<u>Trifolium pauciflorum</u>	
20,074	<u>Trifolium subterraneum</u>	
20,086-20,088	<u>Trifolium parryi</u>	
20,094	<u>Trifolium tridentatum</u>	
20,102-20,104	<u>Trifolium semipilosum</u>	
20,108-20,118	<u>Trifolium subterraneum</u>	

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<sup>1</sup>Blanks apply to previous entries.

## APPENDIX

### Host Legumes - Previous and Current Nomenclature

#### Previous

Astragalus alpinus var. americanus  
Astragalus caryocarpus  
Astragalus chaborasicus  
Astragalus harringtonii  
Astragalus rubyi  
Astragalus striatus  
Cassia chamaecrista  
Cassia fasciculata  
Cassia mimosoides  
Cassia nictitans  
Cracca cathartica  
Crotalaria maxillaris  
Desmanthus depressus  
Desmodium ovalifolium  
Desmodium supinum  
Dorycnium hirsutum  
Dorycnium rectus  
Erythrina reticulata  
Gliricidia maculata  
Hedysarum mackenziei  
Lathyrus ornatus  
Lespedeza cuneata  
Lespedeza hedysaroides  
Lespedeza latissima  
Lespedeza sericea  
Leucaena glauca  
Lotus americanus  
Lotus divaricatus  
Lotus microphyllus  
Lotus tenuis  
Medicago falcata  
Medicago tribuloides  
Mucuna deeringiana  
Oxytropis foliolosa  
Oxytropis koyukukensis  
Oxytropis riparia  
Oxytropis varians  
Petalostemon candidum  
Petalostemon microphyllum  
Petalostemon purpureum  
Phaseolus heterophyllus  
Pisum arvense  
Prosopis vialiana

#### Current

Astragalus americanus  
Astragalus crassicaupus  
Astragalus aduncus  
Astragalus robbinsii var. harringtonii  
Oxytropis riparia  
Astragalus adsurgens var. robustior  
Chamaecrista fasciculata  
Chamaecrista fasciculata  
Chamaecrista mimosoides  
Chamaecrista nictitans  
Tephrosia senna  
Crotalaria senegalensis  
Desmanthus virgatus var. depressus  
Desmodium adscendens  
Desmodium canum  
Lotus hirsutus  
Lotus rectus  
Erythrina speciosa  
Gliricidia sepium  
Hedysarum boreale subsp. mackenziei  
Lathyrus polymorphus  
Lespedeza juncea var. sericea  
Lespedeza juncea  
Lespedeza juncea var. serpens  
Lespedeza juncea var. sericea  
Leucaena leucocephala  
Lotus purshianus  
Lotus suaveolens  
Indigofera gracilis  
Lotus corniculatus var. tenuifolius  
Medicago sativa subsp. falcata  
Medicago truncatula  
Mucuna pruriens var. utilis  
Oxytropis deflexa var. foliolosa  
Oxytropis arctica var. koyukukensis  
Oxytropis glabra  
Oxytropis campestris var. variens  
Dalea candida  
Dalea phleoides var. microphylla  
Dalea purpurea  
Macroptilium heterophyllum  
Pisum sativum  
Prosopis juliflora var. juliflora

Pueraria javanica  
Pueraria thunbergiana  
Sesbania aegyptiaca  
Sesbania exaltata  
Sesbania kirkii  
Sesbania punctata  
Sophora formosa  
Stizolobium deeringiana  
Stizolobium hassjoo  
Stizolobium niveum  
Stylosanthes mucronata  
Trifolium eliolatum  
Trifolium isodon  
Trifolium meneghinimum  
Trifolium occidentale  
Trifolium rydbergii  
Trifolium stenophyllum  
Trifolium supinum  
Vicia dasycarpa  
Vicia sativa  
Vigna sesquipedalis  
Vigna sinensis  
Vigna unguiculata  
Voandzeia subterranea  
Wisteria speciosa

Pueraria phaseoloides var. javanica  
Pueraria lobata  
Sesbania sesban  
Sesbania macrocarpa  
Sesbania tetraptera  
Sesbania sesban subsp. punctata  
Sophora arizonica  
Mucuna pruriens var. utilis  
Mucuna pruriens var. utilis  
Mucuna pruriens var. utilis  
Stylosanthes fruticosa  
Trifolium heldreichianum  
Trifolium obscurum  
Trifolium nigrescens subsp. petrisavii  
Trifolium repens var. biasdettii  
Trifolium rusbyi subsp. reflexum  
Trifolium philisticum  
Trifolium echinatum  
Vicia villosa subsp. varia  
Vicia sativa subsp. sativa  
Vigna unguiculata subsp. sesquipedalis  
Vigna unguiculata subsp. unguiculata  
Vigna unguiculata subsp. unguiculata  
Vigna subterranea  
Wisteria frutescens

## Lyophilized Cultures

Lyophilized cultures are sealed under vacuum and should be opened under aseptic conditions. To reconstitute the pellet, place 1 mL of yeast-extract mannitol broth in the ampule, dissolve, and transfer to a larger volume of broth for incubation.

### Yeast-Extract Mannitol Broth<sup>1</sup>

Solution	Salt	Concentration (molar)	Grams of salt per liter of stock solution
1	Dibasic potassium phosphate (K <sub>2</sub> HPO <sub>4</sub> )	0.57	99.28
2	Magnesium sulfate, heptahydrate (MgSO <sub>4</sub> ·7H <sub>2</sub> O)	.8	199.65
3	Sodium chloride (NaCl)	1.70	99.35

Into 1 L of distilled water add 10 g of mannitol, 0.4 g of yeast extract (Difco), 5.0 mL of stock solution 1, 1.0 mL of stock solution 2, and 1.0 mL of stock solution 3. Adjust to pH 6.5 with hydrochloric acid (HCl).

<sup>1</sup>Vincent, J.M. 1970. A manual for the practical study of root-nodule bacteria. IBP Handbook 15, 164 p. Blackwell Scientific Publications, Oxford, England.

Information Form for New Strain Data  
Records

Complete as much information as possible.

Original host plant \_\_\_\_\_

Common name(s) of host \_\_\_\_\_

Accession numbers, synonyms \_\_\_\_\_

Date of original isolation \_\_\_\_\_

Site of original host plant \_\_\_\_\_

Environment of site (soil, rainfall,  
temperature) \_\_\_\_\_

Culture characteristics: Fast \_\_\_\_\_ slow \_\_\_\_\_  
acid \_\_\_\_\_ alkali \_\_\_\_\_

Other characteristics \_\_\_\_\_

Host for authentication \_\_\_\_\_

Effectiveness (specify host) \_\_\_\_\_

Other host tests \_\_\_\_\_

Location of Other Rhizobium Culture  
Collections

ACCC

Center for Agricultural Culture Collection  
Institute of Soil Fertilizers  
Chinese Academy of Agricultural Sciences  
Beijing (Peking), People's Republic of  
China

Emphasis on peanuts, soybeans, and  
milkvetch.

ATCC

American Type Culture Collection  
12301 Parklawn Drive  
Rockville, MD 20852 U.S.A.

CB

Commonwealth Scientific and Industrial  
Research Organisation (CSIRO)  
Division of Tropical Agronomy  
Cunningham Laboratory  
Mill Road, St. Lucia 4067  
Queensland, Australia

Emphasis on tropical legumes.

CC

CSIRO  
Division of Plant Industry  
P.O. Box 1600, Canberra City  
Austl. Cap. Ter. 2601  
Australia

Emphasis on forage legumes.



CIAT

Centro Internacional de Agricultura  
Tropical  
Apartado Aereo 6713  
Cali, Colombia

Emphasis on beans and tropical forages.

ICRISAT

International Crops Research Institute  
for the Semi-arid Tropics  
Hyderabad, Andhra Pradesh 502 324  
India

Emphasis on pigeon peas, peanuts, and chickpeas.

IITA

International Institute of Tropical  
Agriculture  
Oyo Road, PMB 5320  
Ibadan, Nigeria

Emphasis on cowpeas and soybeans.

NifTAL

University of Hawaii NifTAL Project  
and MIRCEN  
P.O. Box 0  
Paia, Hawaii 96779 U.S.A.

Emphasis on tropical legumes and trees.

NZP

Department of Scientific and Industrial  
Research  
Applied Biochemistry Division  
Private Bag, Palmerston North  
New Zealand

Emphasis on forage legumes.

RCR

Rothamsted Collection of Rhizobium  
Soil Microbiology Department  
Rothamsted Experimental Station  
Harpenden, Hertfordshire  
United Kingdom

SEMIA

Microbiological Resources Center (MIRCEN)  
Instituto de Pesquisas Agronomicas  
Secretaria da Agricultura  
Rua Goncalves Dias, 570  
90.000, Porto Alegre, RS  
Brazil

Emphasis on soybeans, field beans, and tropical forages.





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